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Experiments in Feeding Cows,—have been made recently with a medium cow as to age, flow of milk and condition, medium as to calving time, &c., were made under the right circumstances, so far as they could be.

We give the results, which are worth knowing.

FIRST EXPERIMENT.

8 lbs.	Straw, worth	4 cents.
10 "	Oat fodder,	9 "
10 "	good hay,	9 "
3 "	corn meal,	5 "
		27

Seven days' feed cost $1.89. Number of quarts of milk in seven days 56¾.

SECOND EXPERIMENT.

18 lbs.	oat fodder	23 1-7 cents.
3 "	meal	5
		28 1-7

Seven days' feed cost $1.97. Number of quarts of milk in seven days 60¾.

THIRD EXPERIMENT.

20 lbs.	good hay	18 cents.
3 "	meal	5
		23 "

Cost of seven days' feed $1.61. Seven days milk 59½ quarts.

FOURTH EXPERIMENT.

20 lbs.	hay	18 cents.

3 lbs. meal	5	cents.
3 4-7 lbs. shorts	5	"
	28	"

Cost of seven days' feed $ 1.96. Quarts of milk in seven days, 68.

It will be seen by this experiment that the shorts did not increase the milk enough to pay for them.

FIFTH EXPERIMENT.

20 lbs. hay	18	cents.
3 " meal	5	"
10 " cabbage	5	"
	28	"

Cost of seven days' feed $1.96. Milk in seven days, 74⅜.

It will be seen by this experiment that the cabbage increased the product over the third experiment between 14 and 15 quarts, at an expense of 35 cents.

SIXTH EXPERIMENT.

10 lbs. hay	18	cents.
3 " meal	5	"
10 " small potatoes	5	"
	28	"

Seven days' feed cost $1.96. Milk in seven days 76⅓ quarts.

It will be seen by this experiment that 35 cents worth of potatoes made 16⅝ quarts.

SEVENTH EXPERIMENT.

15 lbs. hay	13½	cents.
2 " cotton seed meal	4	"
3 " cob and oat meal	5	"
9 " small potatoes	4½	"
	27	"

Seven days' feed cost $1.89. Milk in seven days, 77¾ quarts.

EIGHTH EXPERIMENT.

15 lbs. second crop hay	13½	cents.
" cotton seed meal	4	"
cob and oat meal	5	"
9 " potatoes	4½	"
	27	"

20 lbs. second crop hay	18	"
10 " potatoes	5	"
meal	4	"
	27	"

Seven days' feed cost $1.89. Milk in seven days, 88½ quarts.

Measles in Hogs, How to Treat.—Remove the animal from his companions to a warm place, and keep it on gruel; give a teaspoonful of sulphur daily together with a drink of the bittersweet tea, the object being to invite action to the surface and keep it there; if the eruption does not reappear on the surface, rub it with the following liniment, one ounce oil cedar, in sufficient alcohol to dissolve it, then add half a pint of whisky, and a teaspoonful of sulphur. Almost all diseases of the skin in swine may be treated in the same manner.

Cellar.—In the construction of a cellar the first point is to provide such

a drainage as will draw off the water at least one foot lower than the surface of the cellar floor. If the soil be naturally wet, the flooring should be of flag-stones or tiles, and laid hollow. The walls should also be built hollow, and if convenient, with a powerful cement, rather than with common mortar; or at least they ought to be coated over with cement on the inside. In very cold or extremely hot situations, cellars should be fitted with double doors and double windows, and the windows in all such cases ought to fit tightly. The space between the double windows need not be more than from six inches to a foot; but the space between the double doors ought to be at least three feet, so that one door may always be shut before the other is opened. Cellars should not exceed seven feet in height. In general they are better under ground and arched over with masonry; but the same results may be obtained above ground by double walls, very small and double windows, double or thickly thatched roofs, and double doors. Articles that are not frequently wanted are better kept in a dry cellar than in any other place, because they are there less subject to atmospheric changes. If cellars, however, are damp, they are unfit for storing anything except liquors in glass or in earthen vessels.

Cellar Floors; Rat Proof.—The cheapest, best, and most durable cellar floor, which is also impervious to rats, may be made in the following manner: Supposing the cellar wall already laid, dig a trench all around the wall on the inner side, a foot wide and deep, connecting with the cellar drain. In the centre of this trench make a drain by standing two stones bracing against each other at an angle of about forty-five degrees; then fill up the trench with small stones to within two or three inches of the top; cover these stones with a layer of pine shavings, then with the earth, leveling off the same with the floor of the cellar; let the ground of the cellar be gravel.

Cure for Swelled Bags in Cows.—An excellent remedy for swelled bags in cows, caused by cold, &c., is gum camphor ½ oz., to sweet oil 2 ozs., pulverize the gum, and dissolve over a slow fire.

To Keep Milk Sweet, and Sweeten Sour Milk.—Put into the milk a small quantity of carbonate of magnesia.

Effect of Cold on Milk.—The following extract is from the London Lancet, which is considered very high authority on all subjects admitted to its columns:

The effects of a low temperature on milk have been carefully examined by M. Eng. Tisserand, who recently communicated his observations to the Academie des Sciences. He found that if cows' milk is, immediately or soon after being drawn, placed in vessels at various temperatures between freezing point and 90° F., and the initial temperature is maintained for twenty-four or thirty-six hours, it will be found that the nearer the temperature of the milk is to freezing point the more rapid is the collection of cream, the more considerable is the quantity of cream, the amount of butter is greater, and the skimmed milk, the butter and the cheese are of better quality. These facts, he believes, may be explained by Pasteur's observations on ferments and their effects on the media in which they live. It is probable that the refrigeration arrests the evolution of the living organisms which set up fermentation, and hinders the changes which are due to their growth. The facts stated indicate room for great improvement in the methods of storage and preservation of milk. To keep milk at its original quality, extreme cleanliness and a low temperature are absolutely necessary. In the North of Europe, Denmark, etc., the value of cold is already recognized, and in warmer climates the need for its assistance is greater. There is nothing impracticable in the suggestion, since running streams can be used to aid refrigeration. Where the quality of the milk is of greater importance, ice may be employed.

Cream, To Preserve.—Boil the cream for two or three minutes, add half its weight of powdered loaf sugar; stir the whole well together, and put by in bottles closely corked. It will thus continue good for many weeks.

Rules for Farmers.—A correspondent suggests as something "that would interest and profit many young farmer readers," that we should prepare and publish 100 rules for the attainment of success and wealth in farming. A much smaller number, if faithfully adhered to, will contribute materially to success, and ensure, with economy and good habits, sufficient wealth to satisfy the reasonable desires of any one. Among them, the following may be mentioned.

1. Select good land, and reject sterile, no matter how cheap.
2. Raise no weeds, but only profitable crops.
3. Underdrain, wherever needed.
4. Adopt a good rotation of crops and adhere to it.
5. Provide sufficient shelter for domestic animals.
6. Keep everything connected with domestic animals neat and clean.
7. Plough well, cultivate well, do all work well and not slipshod.
8. Accumulate and save manure, and apply it properly.
9. Procure good implements, and take care of them.
10. Raise good animals and take care of them.

The preceding ten rules will be of much use if carried out, and we add two more, to cover them all, viz.:

11. By weighing and measuring, and with careful accounts, ascertain just what every crop or every animal costs you, and find out just what is the market value of each.

12. Employ then those crops and animals which you find give you a good profit, and drop all else.

You can thus have the satisfaction of knowing that you are carrying out Ricardo's two famous rules for acquiring wealth, namely:

1. Cut short your losses.
2. Let your profits run on.

Quantity of Seed required for a Given Number of Hills, or Length Drill.—Asparagus 1 oz. to 60 feet drill; beet 1 oz. to 50 ft. drill; carrot 1 oz. to 180 ft. drill; endive 1 oz. to 150 ft. drill; onion 1 oz. to 100 ft. drill; parsley 1 oz. to 150 ft. drill; parsnip 1 oz. to 200 ft. drill; radish 1 oz. to 100 ft. drill; spinach 1 oz. to 100 ft. drill; turnip 1 oz. to 150 ft. drill; peas 1 qt. to 100 ft. drill; dwarf beans 1 qt. to 150 hills; corn 1 qt. to 200 hills; cucumber 1 oz. to 50 hills; watermelon 1 oz. to 30 hills; muskmelon 1 oz. to 60 hills; pumpkin 1 oz. to 40 hills; early squash 1 oz. to 50 hills; marrow squash 1 oz. to 16 hills; cabbage 1 oz. to 3000 plants; cauliflower 1 oz. to 3000 plants; celery, 1 oz. to 4000 plants; eggplant, 1 oz. to 2000 plants; lettuce 1 oz. to 4000 plants; pepper 1 oz. to 2000 plants, tomato 1 oz. to 2000 plants.

Quantity of Seed required per Acre and Actual Weight of each to the Bushel—Wheat (broadcast) 1¾ to 2 bushels; ditto, in drills, 1½ bushels; weight per bushel, 60 lbs.; rye, broadcast, 1¾ bushels, weight 56 lbs.; oats, broadcast, 2 bushels, weight 33 lbs.; timothy, broadcast, 2 gals, 45 lbs. per bushel; red clover, broadcast, 3 to 4 gals., 60 lbs. per bushel; white clover, broadcast, 8 lbs., 50 lbs. per bushel; lucrene broadcast, 10 lbs., 54 lbs. per bushel; herd or red top, broadcast, 1 to 1½ bushels, 14 lbs. per bushel; bluegrass, broadcast, 1 to 1½ bushels, 14 lbs. per bushel; millet, broadcast, ¾ to 1 bushel, 45 lbs. per bushel; Hungarian, broadcast, ¾ to 1 bushel, 50 lbs. per bushel; corn in hills, 1 to 1½ gals., 56 lbs per bushel; turnips and ruta baga, 1 lb., 50 lbs. per bushel; onion sets, 28 lbs. per bushel.

To Determine Weight of Live Cattle.—Measure in inches the girth around the breast, just behind the shoulder blade, and the length of the back from the tail to the fore part of the shoulder blade. Multiply the girth by the length, and divide by 144. If the girth is less than 3 feet, multiply the quotient by 11. If between 3 and 5 feet, multiply by 16. If between 5 and 7 feet, multiply by 23. If between 7 and 9 feet, multiply by 31. If the animal is lean, deduct 1-20 from the result, or take girth and length in feet, multiply the square of the girth by the length, and multiply

the product by 3.36. The result will be the answer in pounds. The live weight multiplied by 6.05, gives a near approximation to the net weight.

Inspection of the Bottom of Wells.—Sufficient light to enable any one to see the water or earth at the bottom of the well can be directed down the shaft by means of an ordinary looking-glass. If the well be under cover, two glasses will be required, and the ingenious reader will, by a little experimenting, soon be able to arrange them in the right positions.

Cabbage, Culture of.—Of this vegetable there are many varieties, but some are better adapted for growing in gardens than others, the seed of which can be obtained at any respectable seed store. To obtain cabbage early in spring, procure half an ounce of "Atkins's matchless," and the same quantity of the early "Nonpareil," both being dwarf and early; or buy more or less, in proportion to the size of the ground you intend planting. Between the first and the twelfth of August, select an open piece of ground, and, having dug it well, sow the seed, scattering it regularly over the space allotted. Then take the spade, and throw a little soil from the sides of the bed evenly over the surface; press the bed down with your feet; then take the rake and smooth gently over, taking care not to rake so deep as to draw the seed in masses over the bed. Water plentifully during dry weather, and watch carefully that the birds do not molest the shoots when they are breaking through the ground. Sow also at the same time an equal quantity of the "Emperor," or "Wheeler's Imperial," which are larger and somewhat later, and which will give a succession during the greater part of the summer, or, at all events, until the early spring sowing comes in. If the plants have progressed favorably, they will be fit to plant out in the early part of September; and if onions have been grown in the same garden, it would be advisable to plant the cabbage in that piece of ground after the onions are taken off, the ground selected for onions being generally the best in the garden. After properly digging the ground, proceed to mark out the plot for the early sorts, eighteen inches from row to row; commence planting, putting the plants one foot apart in their respective rows, and fifteen inches from the other. After planting, water must be given, unless it be rainy weather. Watch for slugs, and fill up any vacancies that may occur from the seed bed of each sort respectively. As soon as the ground becomes dry on the surface, loosen the earth between the plants to the depth of two inches, which will accelerate vegetation. As the plants advance, draw the earth about them with the hoe, in order to steady them against the wind and protect them from the frost. If these rules are observed, young cabbage fit for cutting, will, under ordinary circumstances, appear in May, although much of course must depend on the season. For a succession, sow early in March, of the large sorts, and again from the middle to the end of May; and should there be some plants left in the seed bed of August sowing, plant them out in March.

Asparagus.—The soil best adapted for this delicious and highly prized vegetable is a light, rich, sandy loam, well mixed with rotten dung or seaweed; the soil should not be less than two and a half feet deep, and before planting the bed should be trenched over to that depth, burying plenty of dung at the bottom. The site of the beds should be such as to derive as much sun as possible during the whole of the day, and neither trees or shrubs should be near. *To raise plants from seed*, they may be sown from the end of February to the beginning of April, the first or second week in March being the usual time. The seed should be inserted with a dibble six inches apart, and an inch below the surface; if the weather be dry, they should be watered frequently, but moderately. When the plants begin to appear, which will be in three or four weeks from the time of sowing, the beds should be carefully weeded. If two plants arise from the same hole, the weaker of the two should be removed. Sometimes asparagus is suffered to remain in the bed where it has been sown, and at other times it

is *transplanted.* This operation is performed about the end of March in a variety of ways ; but the following is one of the most approved methods ;— Dig the space required to the depth of five feet ; sift the mould that is taken from it, and reject all stones, both large and small ; put aside the finest portion of the mould for dressing the bed. Then lay in the materials of the bed in the following order : dunghill manure, eight inches ; turf, six inches ; manure, six inches; sifted earth, six inches ; turf, eight inches ; dung six inches ; finest mould, eight inches ; which will incorporate with the preceding layer of dung. Divide the whole space into beds five feet wide, by paths constructed of turf two feet in breadth and one inch in thickness. The beds being thus prepared, remove the plants carefully from the seed bed, with a narrow elongated dungfork, taking the greatest care not to injure the roots ; the plants must then be laid evenly together, to prevent the roots from becoming entangled ; this process should be performed expeditiously, as the plants suffer from protracted exposure to the air. In planting them, the bud or top of the shoot must be placed to a depth of an inch and a half in the ground, and at the same time the roots must be spread out as widely as possible, somewhat in the shape of an open umbrella. As each plant is put in the ground, a small piece of stick must be placed near to mark the spot. As soon as the earth is settled and dry, a spadeful of fine sand should be heaped on each plant in the form of a molehill. The plants ought to be two years old when they are transplanted ; they will even take at three, but at four they are apt to fail. After the plants have been transplanted three years, they will be fit to cut for use. Cut off the buds within the ground with a sharp pointed knife, or small saw, thrusting it down straight close to each shoot, separately ; cut it off slantingly and with care not to wound the younger buds shooting below. Cutting should be discontinued about the first week in June, the common practice being to let asparagus grow when green peas come in. Towards the end of October or beginning of November, the stalks which have run up to seed having done growing, or begun to decay, cut them down close, and carry them away ; then hoe off all the weeds from the beds, and lay on a coating of good dung, and thus let it remain till spring. About the end of March, or the beginning of April, before the buds begin to advance below, loosen the surface of the beds with a three-pronged fork, and turn up the top earth carefully without injuring the roots ; this process by admitting air, moisture, and sunshine, enables the shoots to rise in free growth. *Forcing* asparagus takes place in the beds themselves, without disturbing the roots ; the trenches are filled with hot dung, and the beds are covered with the same material about six inches deep ; by these means the plants will be fit to cut early in the spring, but at the same time the tenderness and flavor suffer in proportion. When it is desired to have exceedingly large heads of forced asparagus, pieces of bamboo, or any other hollow tubes, should be put over the shoots when they first make their appearance, they will thus acquire a length of as much as eighteen inches. As the successful culture of asparagus mainly depends on the preparations that are made for it, it would be as well for an inexperienced person to have in the first instance the assistance of a practical gardener.

Home-made Stump Machine.—Take 3 pieces of common joists, put them together in form like a common harrow, letting the tapering ends lap by each other some six inches, making a place for the chain to rest in. Cut off the roots at any distance you please from the stump, place the machine at one side of the stump, tapering end up ; hitch the chain on the opposite side and pass it over the machine ; then hitch a good yoke of oxen thereto, and you will see the stump rise. Another method is as follows : in the fall of the year bore a 1-inch hole 18 inches deep into the centre of the stump, and put in 1 oz. of saltpetre, filling up with water, and plugging the hole up. In the spring take out the plug, put in half a gill of kerosene and set fire to it. It will burn out the stump to the farthest root. Here is another plan : in the fall, with an inch auger, bore a hole in the centre of the stump

10 inches deep, and put into it a ½ lb. of vitriol, and cork the hole up very tight. In the spring the whole stump and roots extending all through their ramifications will be found so rotten that they can be easily eradicated.

MINERAL CONSTITUENTS ABSORBED OR REMOVED FROM AN ACRE OF SOIL BY THE FOLLOWING CROPS.

	Wheat, 25 bushels.	Barley, 40 bushels.	Turnips, 20 tons.	Hay, 1½ tons.
	Lbs.	Lbs.	Lbs.	Lbs.
Potassa	29.6	17.5	47.1	38.2
Soda	3.	5.2	8.2	12.
Lime	12.9	17.	29.9	44.5
Magnesia	10.6	9.2	19.7	7.1
Oxide of Iron	2.6	2.1	7.1	.6
Phosphoric Acid	20.6	25.8	46.3	15 1
Sulphuric Acid	10.6	2.7	13.3	9.2
Chlorine	2.	16.	3.6	4.1
Silica	118.1	129.5	247.8	78.2
Alumina	....	2.4	.....	.....
Total	210.00	213.00	423.00	209.00

Hay.—270 cubic feet of new meadow hay, and 216 and 243 from large or old stacks, will weigh a ton, 297 to 324 cubic feet of dry clover weigh a ton.

Hens Eating Feathers.—To prevent hens from eating their feathers give them twice a day four parts of wheat bran to one of corn meal, by measure, a tablespoonful of salt to every eight quarts of this mixture, scalded and cooled. The hens are after the salt contained in the minute globules of blood at the end of the quill. Hens fed in this way or occasionally furnished salt, will never pull feathers. The salt should be dissolved in hot water before mixing with the feed. This is a certain antidote.

Hatching Eggs.—Be particular and set the eggs upon the large end as soon as brought in from the nest, in some material that will keep them in position, (either seasoned saw-dust or kiln-dried bran scattered in the bottom of a shallow box or basket) there will be found little difficulty in their hatching, providing the birds are all right and the eggs are not allowed to become chilled. I have known eggs to hatch well when three weeks old, and make good strong chicks in early spring, but they must neither be kept too warm nor yet too cold. They should, however, be kept as cool as possible without being chilled. The cupboard temperature might do well, if it is even. I should not like it any higher than 70°; better lower, and should range somewhere between 40° and 50° and be steady. If the eggs are kept too warm the germ is weakened. A little precaution as to temperature is necessary.

Soaking Seeds.—By sprouting garden seeds before sowing, there is a gain of three or four days in the time of ripening.

To Preserve Cider.—The following recipe for preserving cider was tested last fall by a friend, and found to be of all that is claimed for it: When the cider in the barrel is in a lively fermentation, add as much white sugar as will be equal to a ¼ or ¾ of a pound to each gallon of cider (according as the apples are sweet or sour), let the fermentation proceed until the liquid has the taste to suit, then add ¼ of an ounce of sulphite (not sulphate) of lime to each gallon of cider, shake well, and let it stand three days, and bottle for use. The sulphite should first be dissolved in a quart or so of cider before introducing it into the barrel of cider.

Rot in Potatoes.—If potatoes are planted four inches below the surface they will not rot. This is the substance of the great prize essay of the

Royal Agricultural Society on the "cause and cure of the rot in the potato." Try it; if so, the sooner known and practised the better.

To Preserve Potatoes from Rot.—Dust over the floor of the bin with lime, and put in about 6 or 7 inches of potatoes, and dust with lime as before, then more potatoes, using about 1 bushel of lime to 40 bushels of potatoes. The lime improves the flavor of the potatoes, and effectually kills the fungi which causes the rot.

An old veteran farmer with 63 years' experience, has successfully fought the potato rot *in the ground*, as follows: He plants them in the latter part of April, or beginning of May, and in the old of the moon. When six inches high they are plastered and dressed out nicely. Now for the secret. When blossoming, take two parts plaster, and 1 part fine salt, mix well together, and put one large spoonful of this compound as near the centre of each hill as possible. When ripe, take them out of the ground, have them dry when put in the cellar, and keep them in a dry, cool place.

To Prevent the Fly in Turnips.—From experiments lately made, it has been ascertained that lime sown by hand, or distributed by a machine, is an infallible protection to turnips against the ravages of this destructive insect. It should be applied as soon as the turnips come up, and in the same daily rotation in which they were sown. The lime should be slacked immediately before it is used, if the air be not sufficiently moist to render that operation unnecessary.

Artificial Hatching is a mode by which incubation is effected by the application of heat, and without the intervention of the hen. An establishment for this purpose was set on foot in London some years since, with generally successful results, and in which the following process was adopted: An oven consisting of eight floors or compartments, was employed to contain the eggs, while they were subjected to heat from steam pipes. Each compartment held upwards of two hundred eggs, and the whole exhibited the hatching process in all its various stages. The regularity with which the temperature was maintained as well as accommodated to each peculiar stage of the process, brought out the chick with much greater certainty than when the incubation was performed by the hen. When the chicks emerge from the shell they are immediately removed from the oven, but are allowed to remain for a few hours until they become dry; these are then removed and put into a glass case at the end of the room. They are here for the first time fed, though not for twenty-four hours after being hatched; the material scattered among them consists of small bruised grits, or particles little larger than meal; these they eagerly pick up without any teaching, their instinctive desire for food being a sufficient monitor. After the brood has been kept in the glass case, which is partially open, for two or three days, and been thus gradually accustomed to the atmosphere, they are removed to one of the divisions of a railed enclosure on the floor. At six in the evening they are put to rest for the night in coops, twelve together in a coop: these coops are small wooden boxes lined with flannel, and furnished with a flannel curtain in front, to seclude and keep warm the inmates as comfortably and securely as if under the wing of the mother. At six or seven in the morning, they are again allowed to come forth into their court-yard, which being strewed with sand, and provided with food and water, affords them all the advantages of a run in an open ground.

Poultry and Eggs.—One of our subscribers says: I do a small business in raising and putting up garden seeds; last fall, a year ago, as I was clearing out some red pepper seeds in my back yard, I threw the shucks and chaff promiscuously about. I soon observed my hens picking them up and swallowing them with great avidity. They soon commenced laying eggs though they had laid none for a month before. I have fed them regularly two or three times a week since then with red pepper, and they have never yet stopped laying, summer or winter, spring or fall, except while they were hatching their chickens, and I am confident from more than a year's ex-

perience, that by this method hens may be made to lay the year round.—*Southern paper.*

To Make Hens Lay.—If a teaspoonful of cayenne pepper is given to a dozen hens with their food every other day, winter and summer, the quantity of eggs they will produce will be nearly doubled. So says Dr. Hall.

To Destroy Moss on Trees.—Paint them with white-wash made of quick lime and wood ashes.

To Kill Lice on Stock of all Kinds.—Take 1 ounce of cocculus indicus, which should be bought of any druggist at from twelve to fifteen cents per pound, and steep it in one gallon of water, and apply it as is recommended for tobacco extract. It will be found quite as effectual, and much more pleasant to use. I have used it with unvarying success for killing lice on canary birds. Dip them in, keeping the head out, and soak well. It is perfectly safe.

Death for Vermin on Plants or Animals.—Pour a gallon of boiling water on one pound tobacco leaves, strain it in twenty minutes; for vermin, on animals or plants, this decoction is certain death.

Lice on Cattle—May be destroyed with a decoction of two ounces of lobelia seed in one quart boiling water. Let it stand and keep warm for a few hours, until the strength is extracted. Apply with a sponge.

A decoction of cocculus indicus, made in the same way, will answer when the lobelia seed cannot be obtained.

How to Make Hens Lay.—Chicken coops should be kept dry and wholesome. It is not necessary to clean them often if they are kept well littered with dry earth, ashes or dry sawdust. Give the fowls liberty to roam at large, if possible; if not, supply them with animal food in some shape, also lime, ground bone and green vegetables. A box containing pulverized charcoal should always be within reach of the fowls, as it is a great preventative of disease. Do not be afraid of snow water. Fowls will always drink it whenever it is convenient, and I have never seen any ill effects from it.

Your supply of eggs will depend very much upon the quantity and quality of food furnished. Never overfeed. More fowls are ruined by being fed too sparingly. I have often heard people complain after this style: "My hens do not lay worth a cent, and they have all the corn they can eat." Some fowls that have a large range, and exercise much, may lay well if they are stuffed day after day with corn; but it is very poor policy and economy to feed that way. Give fowls light food and not all they can eat. A variety of hard food (corn, barley, wheat, buckwheat, etc.,) given once a day sparingly is necessary; but the principal supply should be soft food, thoroughly scalded. Corn and oats ground together, such as is commonly used for horse feed, and wheat bran (the coarsest), mixed in equal proportions by measure, well scalded, is the best and most economical food that can be used. Give this in the morning and grain sparingly at night. Never feed oftener than twice a day, and if they have fields to roam over, feed no more than one-half what they would naturally eat. Occasionally give them a little ground mustard, ginger or pepper in their food, but do not always be doctoring them. Follow these rules, and if your fowls do not lay you may reasonably expect they never will. The food commended above is also suitable for young chicks, young ducks and old ducks, and, in short, all kinds of poultry. Never feed raw mush; do not confine your chicks to a steady diet of raw meal and cold water. On a farm, where they have unlimited range, they may do well; but cracked corn is far better, and should be alternated with soft food. Boiled eggs for chicks can be dispensed with; they are too expensive, and the scalded food answers every purpose. Remember that much depends upon the proper manner of feeding.

Chicken Cholera.—The most successful poultry raisers use the following remedy: Take equal parts of sulphur, alum, resin, cayenne pepper and copperas. Powder all ingredients not purchased in a fine condition; mix thoroughly, and add about two tablespoonfuls of this mixture to six

quarts of dry meal, incorporating it thoroughly with the meal, and wetting it. If they do not eat readily, keep other feed away from them, and they will soon come to terms. If the fowls are worth it, give them tea to drink instead of water. Persons using this remedy need have no fear of the disease. If the fowls are healthy, the remedy is usually fed twice a week, sometimes once a week, and in some instances once in two weeks, and in rare cases once a month; but if omitted entirely, the disease breaks out, and the remedy is given once a day, usually curing all the fowls that will eat.

Chicken Cholera.—A handful of copperas to eight quarts of water will usually cure poultry, and keep them free from the disease; give it daily.

Diarrhœa in Chickens.—To avoid this disease chickens should not be fed at all until two days old, then give them fine corn meal for a week, then mix with a little bran; put in a very little salt and let the meat, cabbage and boiled eggs alone, the chicks want nothing of the sort. Give them sand to pick as they wish.

Bantam.—There are numerous varieties of this species of domestic fowl, the most valuable of which are the sebright, the nankin, the game, spangled partridge, etc. Bantams were formerly prized according to the amount of feathers on their legs, but this is now considered their greatest defect. The characteristics of a well-bred bantam are a beak short and curved, the head narrow, with rounded forehead, bright eye, small ear lobes, short back, breast prominent, round full body, and carriage erect. A rose comb is considered essential in most varieties, and always to be preferred. The male bird should not weigh more than twenty ounces, the female not more than fifteen. The mode of rearing and keeping bantams does not differ in any material point from that adopted for the domestic fowl generally. From their size, and the tenderness of their flesh, they may be sometimes substituted for chickens when these are not to be obtained; and their eggs are at all times considered a delicacy for weak and deranged stomachs. Bantams are comparatively inexpensive to keep, and in addition to being prolific layers, they are particularly useful for sitting upon the eggs of partridges or pheasants.

How to Fatten Fowls.—Confine your fowls in a large airy enclosure, and feed them on broken Indian corn, Indian meal or mush, with raw potatoes cut into small pieces, not larger than a filbert, placing within their reach a quantity of charcoal broken into small pieces. Boiled rice is also good.

Best Way to Dry Apples.—The most general method adopted in drying apples is, after they are pared, to cut them in slices, and spread them on cloths, tables, or boards, and dry them out-doors. In clear and dry weather this is, perhaps, the most expeditious and best way; but in cloudy and stormy weather this way is attended with much inconvenience, and sometimes loss, in consequence of the apples rotting before they dry. To some extent they may be dried in this way in the house, though this is attended with much inconvenience. The best method that I have ever used to dry apples is to use frames. These combine the most advantages with the least inconvenience of any way, and can be used with equal advantage either in drying in the house or out in the sun. In pleasant weather the frames can be set out-doors against the side of the building, or any other support, and nights, or cloudy and stormy days, they can be brought into the house, and set against the side of the room near the stove or fire-place. My frames are made in the following manner: Two strips of board, 7 feet long, 2 or 2½ inches wide—two strips 3 feet long, 1½ inches wide, the whole ¾ of an inch thick—nail the short strips across the ends of the long ones and it makes a frame 7 by 3 feet, which is a convenient size for all purposes. On one of the long strips nails are driven 3 inches apart, extending from the top to the bottom. After the apples are pared, they are quartered and cored, and with a needle and twine, or stout thread strung into lengths long enough to reach twice across the frame; the ends of the twine

are then tied together, and the strings hung on the nails across the frame. The apples will soon dry so that the strings can be doubled on the nails, and fresh ones put on or the whole of them removed, and others put in their place. As fast as the apples become sufficiently dry they can be taken from the strings, and the same strings used to dry more on. If large apples are used to dry, they can be cut in smaller pieces. Pears and quinces, and other fruits that can be strung, may be dried in this way.

Growing Oats.—Oats are usually put upon the poorest land and given the poorest cultivation. The crop will of course correspond, and the land be much worse for the crop and treatment. It is therefore no wonder that the oat crop is said to impoverish the soil. Now, the oat crop is an important one; if the land is made rich enough and put in order as for other crops—say barley and wheat—there will be a yield that will often surpass in value the other crops, and without leaving the land in the usual bad condition. The soil, well shaded as it is by a good crop, will retain its mellowness and be in condition for another crop, with or without manure, according to the degree of fertility. The oat is a hardy, thrifty plant; it will bear the frost well and may therefore be sown early. This is one of the main advantages of the crop. It should be sown as early as possible after the ground is dry and mellow enough to receive the seed. If there is good drainage it is seldom that the crop, even with very severe weather, will be hurt. This will secure an early harvest, and insure bright straw and a plump berry. On the other hand, late sowing is associated with rust.

Yoking Cattle.—The amount of labor, and the ease with which it may be performed, in agricultural practice, are materially influenced by the manner in which cattle are yoked to the plough. There are two methods in general use: one, yoking in pairs; the other, yoking in a single line. There are advantages and disadvantages attending each way; and the only method of arriving at a just conclusion is to compare these, and apply the deduction to such special circumstances as may exist. A disadvantage of yoking in pairs is, that in ploughing the furrows betwixt the ridges, the land-cattle go upon the ploughed land, and tread it down with their feet; this, especially if the land is wet, hurts it very much. Another disadvantage is, that when there is but as much of the ridge unploughed as to allow the land-cattle to go upon it with difficulty, they are frequently either going into the opposite furrow, and thereby giving the plough too much land; or, which is worse, they are jostling the furrow-cattle upon the ploughed land. When cattle are yoked in a line, they all go in a furrow. This necessitates the giving the plough more land than ordinarily. Another disadvantage is, that horses and oxen, under such conditions, are apt to throw the burden on their fellows. This they have a better opportunity of doing when yoked in a line, as each pulls by the traces of the one behind him; and, therefore, with the exception of the foremost horse, it is difficult to tell when they neglect their work. Another inconvenience attending yoking cattle in a line is, that when the fore-cattle are all yoked to the traces of the hindmost, it is obvious that, as the beam to which the draught is fixed is much lower than the shoulders of the first horse, by which the rest pull, such a weight must be laid upon his back or shoulders as must render him incapable of giving any assistance. When a body is to be moved forward, the nearer the direction of the force applied, approaches to the direction of the body, the greater is the influence exercised; and, therefore, as the plough moves horizontally, and as the direction of the united draught of a plough with the cattle yoked two abreast is more horizontally inclined than the direction of the draught in a plough with the cattle yoked in a line, the same force applied will have greater influence. This fact is confirmed when the cattle are yoked in pairs; for each has then a separate draught. The goadsman knows by the position of the yokes, whenever one of the horses does not draw equally well with his fellow; and the ploughman perceives, by the going of the plough, whenever either of the two pairs does not draw

equally well with the other; for if the pair that go foremost neglect their work, the plough is pulled out of the ground; and if the pair that go hindmost neglect their work, the plough enters the soil too deeply. These different modes of yoking are, also, in a great measure dependent on the particular soil. When the land is stiff and the labor severe, yoking the cattle in pairs seems preferable, as it affords the strongest draught; and when the land is wet and in danger of being injured by the treading of the cattle, the yoking them in a line confines them to the bottom of the furrow, and prevents a great amount of harm.

Calves, Rearing of.—Calves are either suckled by the mother or brought up on milk by hand. When they are suckled, if the byre be roomy enough, stalls are erected for them against the wall behind the cows, in which they are usually tied up: or they are put into large loose boxes at the ends of the byre; and unfastened at stated times to be suckled. When brought up by hand, they are put into a separate apartment from their mothers, and each confined in a crib, where the milk is given them. The crib for each calf should be four feet square and four feet in height. Abundance of light should be admitted, either by windows in the walls or skylights in the roof; thorough ventilation and a regular supply of fresh air should also be attended to. The crib should be fitted up with a manger to contain cut turnips or carrots, and a high rack for hay, the top of which should be as much elevated above the litter as to preclude the possibility of the calf getting its feet over it. The first food that the calf receives, consists of the milk obtained from the cow for the first four days after calving. It is then of the consistence of the yolk of an egg, and forms an appropriate food for the young calf. On giving it its first feed by the hand, in the crib, it may either be raised to its feet, or suffered to lie still. In whichever position the food is taken, it should be administered as follows:—Place the food in a small dish or pail; put the left arm round the neck of the calf, and support its lower jaw with the palm of the hand, keeping the mouth a little elevated and open, by introducing the thumb of the same hand into the side of its mouth. Then fill the hollow of the right hand with milk, and pour it into the calf's mouth, introducing a finger or two with it for the calf to suck while it is swallowing the liquid. Let it take handful after handful, in this manner, until it is satisfied. In this way it should be fed as often as the cow is milked, which is at first three times a day at least. After the first two or three days, the following method of feeding may be substituted: put a finger or two of the right hand into the calf's mouth, and holding the dish or pail of milk with the left under its head, bring the head gradually down into the pail, and by aid of the fingers induce it to take a few draughts of the milk; while it is doing this, gently withdraw the fingers, holding the head down at the same time, taking care, however, not to dip its nostrils into the milk. In a few days the fingers will not be required, and in a few more the calf will drink of its own accord. For the first month the calf should have as much sweet milk warm from the cow as it can drink. It will be able to take three meals a day, and nearly three quarts at each meal. After the first month, to the end of the third, the quantity of milk is divided between two meals, morning and evening. In some cases half sweet and half-skimmed milk are given to the calves, and in others a substitute for milk is provided, by making gelatine of boiled linseed or sago. The linseed jelly is easily made by boiling good linseed in water, and while it is in a hot state to pour it into a vessel to cool, where it soon becomes a firm jelly; a portion of this is taken for every meal, and incorporated with a little warm milk. Sago may be prepared in the same manner; but a larger proportion of milk is required to be given with it. A third substance is made from pea-meal. For this purpose pour hot water upon the meal, and stir until the mixture is smooth; let it stand to cool, and when it becomes a jelly, mix a portion of it with as much new warm milk, into a consistence that the calf can easily drink. Suckling is a superior mode of rearing calves, provided the calf has free access to the cow

which is supporting it; but if it be allowed to suckle at certain intervals only, bringing up by hand is preferable. As the season advances and the air becomes mild, and when the calves have attained the age of two months, they should have access to the open air during the day; and after some days' endurance, may be sheltered at night under the shed instead of being again put in the crib. At this time sweet hay should be put in their racks, and the mangers in the shed provided with Swedish turnips. At three or four months old, according to the supply of milk, and the ready state of the grass to receive them, the calves should be weaned in the order of seniority, due regard being paid to their individual strength. When weaning is determined upon, the supply of milk should not be withdrawn all at once, but lessened daily, and given at longer intervals. At the same time that the supply of milk is diminished, the calf should be enticed to take other food, such as new bundles of the most cloverly portions of hay, fresh turnips or carrots sliced, a little pounded oil cake, and pure water at will. A small sheltered paddock, near the steading, is an excellent place for weaning calves, before turning them out into a pasture field. When calves are reared for *Veal*, they are suckled three or four times a day for the first three or four days, and then twice a day. They are placed in boarded boxes, four feet high, and just large enough inside to admit of the calf turning. The calf is fed thus for about ten weeks, when it will attain about 35 lbs. per quarter, and is then considered prime veal. Calves are subject to many diseases. The *navel-ill* is a bleeding from the navel string; and in this case, a ligature should be passed close round it, a pledget of tow, well wet with Friars' balsam, be placed over it, and changed every morning and night. Sometimes when there has been previous bleeding, inflammation suddenly appears about the navel between the third and tenth day. Fomentation should be applied, in order to disperse the tumor, and two or three doses of castor-oil given, made into an emulsion by mixing it with egg. If when the inflammation abates, extreme weakness should ensue, gentian and laudanum, with a small quantity of port wine, may be administered. For simple *costiveness*, the best remedy is the milk that comes from the cow for the first four days after calving. But in confirmed cases, doses of warm water, containing a solution of two or three ounces of Epsom salts, should be frequently administered. *Diarrhœa* is a disease to which calves are peculiarly liable. They are most subject to it when put out to grass at too early an age. The first application of a remedy should be a mild purgative, to remove, if possible, the irritation of the bowels; this should be followed by anodynes, astringents, and alkalies, with carminatives, the withdrawal of every sort of green food, and the administration of flour or pea-meal gruel. The following mixture is extremely serviceable in these cases, and it is one which may advantageously be kept always ready at hand:—

Prepared chalk	1 oz.
Winter's Bark, powdered . .	1 oz.
Laudanum	1 oz.
Water	1 pint.

Give two or three tablespoonfuls, according to the age and condition of the animal, twice or thrice a day.

Cow, Management of.—A good cow is a source of constant profit, provided it be properly managed. Cows intended for the dairy should be particularly well housed and fed; for this purpose a clean and warm cow-house is of the utmost importance, and also a sweet pasture. If cows be kept at grass, it is a good plan to allow them constant access to a little hay, which prevents scouring, especially at an early season; or, if they be kept within doors and fed on succulent artificial grasses, a little hay may be occasionally necessary, to prevent the purgative effects of green food. Cows kept at pasture will require from one to two acres of land each, to keep them during the summer; but if housed, the produce of half or three-quarters of an acre will be sufficient. The *best mode of feeding* is as follows: From the

first of May to the first of November, cows should be fed upon various successions of green food, and the more varied the better. When the various grasses have been mown for the last time and consumed, the fresh leaves of cattle-beet and cabbage (the latter in small quantities, lest they should flavor the milk) will supply them with food until the roots of mangold-wurzel, &c., are ready for use. These roots are given with most advantage either steamed or boiled, or at least scalded with hot water, and chopped up and mixed with chaff, bran, &c., with a sprinkling of salt added to promote digestion. The quantity of roots given daily to a cow producing milk, from November to May, may be stated at forty-two pounds of mangold-wurzel, sixty pounds of Swedish turnips, or twenty-eight pounds of potatoes. When roots are given to a cow in their raw state, they should be cut into small pieces, to prevent choking. Before clover, lucerne, and similar food is given to a cow, it should be cut some hours previously, to allow the fixed air to escape; and it should also be given in small quantities at a time, for if these precautions are not observed the animal is likely to over-gorge itself, and sometimes even burst. Turnips and carrots form excellent articles of food, and cannot be too strongly recommended, especially for winter sustenance. Of all vegetable productions, however, the *cabbage* is perhaps the most exuberant, particularly the drum-headed species, which will be found to afford a supply of milk superior to any other vegetable. Any disagreeable flavor which the cabbage is sometimes liable to impart, may be removed by dissolving an ounce of saltpetre in a quart of spring water, and mixing about a quarter of a pint of it with ten or twelve gallons of the milk as it comes from the cow. A cow kept in confinement requires much hand-rubbing, to keep her skin in a healthy state, and prevent the irritation which is always the consequence of high feeding and want of air and exercise; she should therefore be regularly curried and brushed. The labor thus bestowed assists in circulating the blood, and to exterminate the old hair in favor of the new. *The hours of milking* should be regular, and generally once in twelve hours, this being necessary for the due secretion of milk; some cows, however, have such a flow of milk for the first three months after calving, especially in the months of May, June, and July, as to require to be milked three times a day. When *a cow has been milked for several years, and begins to grow old*, the most advantageous treatment is to make her dry. To effect this, bruise six ounces of white rosin, and dissolve it in a quart of water. The cow having been housed, should then be bled, and afterwards milked; the above mixture should then be administered, and the animal finally turned into good grass. She is then no longer to be milked; but to be fattened on rich vegetables. *Cows intended for breeding*, should be carefully selected from those which give plenty of milk. During three months previously to calving, if in the spring, they should be turned into sweet grass; or if it happen in the winter, they ought to be well fed with the best hay. The day and night after they have calved, they should be kept in the house, and their drink confined to lukewarm water only. They may be turned out the next day, if the weather be warm, but regularly taken in for three or four successive nights; or if the weather be damp and cold, it is better to gird their bodies round with sacking, or to keep them wholly within. Cows thus housed, should be kept in every night, till the morning cold is dissipated, and a draught of warm water should be given them previously to their going to the field. If the udder of a milking cow becomes hard and painful, it should be fomented with warm water, and rubbed gently with the hand. Or if the teats are sore, they should be soaked in warm water twice a day; and either be dressed with soft ointment, or washed with spirits and water. When any such complaints exist, the milk had best be given to the pigs. To prevent cows from sucking their own milk, as some of them are apt to do, rub the teats frequently with strong rancid cheese, which will prove an effectual remedy.

The Age of Cattle.—There are certain points connected with the den-

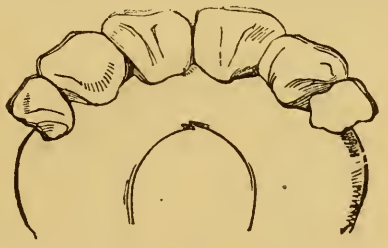
tition of the ox which ought to be understood by every practical farmer, for it is by the characters and changes of the incisor teeth of the lower jaw, that the age of the ox may be the most correctly estimated. The regular number of these incisors, as we have stated, is eight; but the first set are deciduous, being gradually shed, and replaced by a new series. The new-

BIRTH.

born calf has generally two central incisors protruding through the gum, and more or less developed; these, like the others above to follow, are covered with white enamel, and have sharp edges and slender roots. About the

SECOND WEEK.

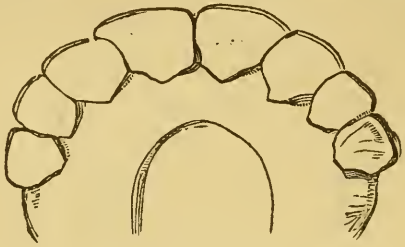
close of the second week, a tooth on each side of this central pair cuts the gum, making the number four; at the end of the third week, the number



THIRD WEEK.

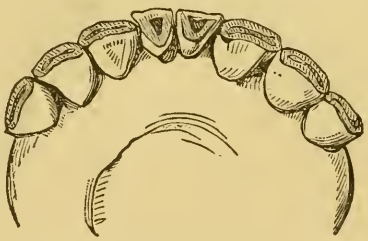
will be increased to six; and at the termination of the fourth week the full number of the deciduous, or milk incisors, will be complete. At this time

the upper line of the sharp edges of the two central incisors has begun to wear, the osseous portion of the tooth appearing where the enamel is abraded; this increases, and, in the course of two months, the next teeth will begin to show signs of wearing, and in about three months the next in succession; till in the course of four months or a little more, the whole set



FOURTH WEEK.

show the effects of use, but the four central teeth by far the most decidedly. At this time, independently of their wearing down by attrition, the two central teeth begin to diminish in size; at first this is not very perceptible, but in the course of a few months, the change will be very palpable. This diminution is the result of a process of absorption, which goes on with increased rapidity as the new teeth in their nutrient cells beneath, become more and more developed; the worn surface of the teeth in question assumes a triangular form, with an oblique inclination inwards, the osseous portion appearing as a distinct central mark. At the age of about eight months the



EIGHT MONTHS.

diminution and wearing down of the two central incisors is very decided; and before the close of the twelvemonth, the next incisor on each side will show the same appearance, and the four, instead of being close together,

ELEVEN MONTHS.

will be separated from each other, especially at their base: at the close of fifteen months, the number of teeth thus diminished by absorption, worn by

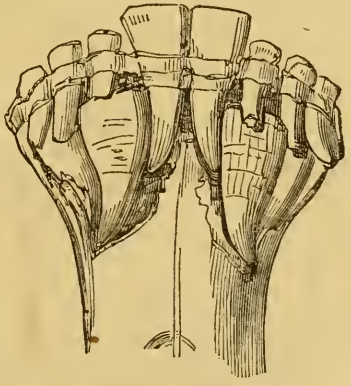
FIFTEEN MONTHS.

use, and separated from each other, will extend to six; and at the close of eighteen months the whole eight will appear as little worn rudiments.

EIGHTEEN MONTHS.

During these changes the ox experiences more and more difficulty in cropping his herbage, and from this cause, and the action going on connected with the formative process of the permanent teeth, in their capsules or cells, the animal is subject to many disorders, and is liable to become out of condition, especially in pasture grounds where the herbage is not abundant and succulent.

Still these rudiments of teeth remain for some months, their decrease continuing, first more especially in the two central teeth; till, at the commencement of the second year, the two central permanent teeth shoot up,



TWO YEARS

and push out the mere relics of their predecessors. During this process, the extremity, or alveolar margin of the jaw itself, is growing and widening, so as to afford room for the development of the rest of the teeth yet in their capsules; and the increase of both teeth and jaw goes on in according harmony. It is not until towards the close of the second year that the next incisor on each side takes the place of its temporary predecessor; nor

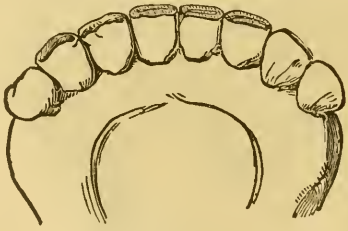
THIRD YEAR.

until the close of the third that the next in rotation succeed. The canine milk-teeth, however, are now mere rudiments, and they give place at the

FOURTH YEAR.

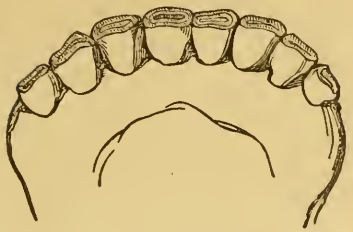
close of the fourth, or beginning of the fifth year, to their successors; in all changes some allowance must be made for the vigor or the weakness of the animal; but such is the average routine.

The last teeth obtained are smaller than the rest, and can scarcely be said to be fully grown until a few months have elapsed. The whole set is complete, but while the outer teeth have been growing, the two central per-



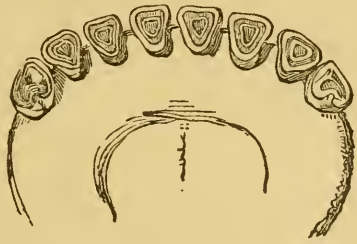
FIFTH YEAR.

manent teeth first, and then the next, have been wearing, and show the marks of attrition; which, at the age of six years, will have extended to the whole set. The teeth become flattened at the top, with a dark central mark, bounded by a line of bone, and this by the layer of enamel. As yet



SIXTH YEAR.

the four middle teeth are the largest; but, again, by slow degrees, a change takes place, and the process of absorption and wearing down goes on. First, the two central teeth show this, then the next on each side, till,



TENTH YEAR.

at the age of ten the four middle teeth are smaller than the outermost two on each side, which, nevertheless, are greatly worn. The animal has turned the grand climacteric, and the teeth continue more and more to show the ravages of age; but, as among other domestic animals, and the human species, not invariably to the same extent, the process being slower or quicker according to circumstances. At sixteen the ox is old, but there are many instances in which the cow will give milk to the age of eighteen or twenty; and rare cases are on record in which the cow has given milk, and suckled a calf, at the later date, even in her thirty-first or thirty-second year.

With respect to the grinders, or molar teeth, they cannot be conveniently examined in the living animal; nor, even were they accessible, could a very certain conclusion be deduced from them.

The calf is born with one or two milk grinders on each side, above and below; but by the fifteenth or twentieth day, the number is increased to three.

A fourth molar, permanent, appears in the sixth or eighth month after birth; a fifth molar, permanent, in the twentieth or twenty-second month after birth; and a sixth molar, in about the fiftieth or fifty-second month. The first milk molar is shed about the time when the fifth molar appears, and the second and third, at intervals of ten or twelve months.

Cattle.—Under this head is included the ox tribe. The first point to be ascertained in examining an ox is its purity of breed, and this may be arrived at from several indications. In a pure breed, the color of the bald skin on the nose and round the eyes is always definite, and without spots. When horns exist they should be small, tapering, and sharp pointed, long or short, according to the breed, and of a white color throughout in some breeds, and tipped with black in others. The second point to be ascertained, is the form of the carcass. It is found that the nearer the section of

the carcass of a fat ox, taken longitudinally, vertical, transversely vertical, and horizontally, approaches to the figure of a parallelogram, the greater quantity of flesh will it carry within the same measurement: to do this, it should possess the following configuration:—The back should be straight from the top of the shoulder to the tail. The tail should fall perpendicularly from the line of the back. The buttocks and twist should be well filled out. The brisket should project to a line dropped from the middle of the neck. The belly should be straight longitudinally, round laterally, and filled at the flanks. The ribs should be round, projecting horizontally, and at right angles to the back. The hocks should be wide and flat; and the rump from the tail to the hocks should be well filled. The loin bones should be long, broad, flat, and well filled; but the space between the hocks and the short ribs should be rather short and well arched over, with a thickness of beef between the hocks. A long hollow from the hocks to the short ribs indicates a weak constitution, and an indifferent thriver. From the loin to the shoulder-blade should be nearly of one breadth, and from thence it should taper a little to the point of the shoulder. The neck-vein should be well filled forward, to complete the line from the neck to the brisket. The covering on the shoulder-blade should be as full out as the buttocks. The middle ribs should be well filled, to complete the line from the shoulders to the buttocks along the projection of the outside of the ribs; these constitute the principal points that are essential to a *fat ox*. The first of the points in judging of a *lean ox*, is the nature of the bone. A round, thick bone indicates both a slow feeder and an inferior description of flesh. A flat bone, when seen on a side view, and narrow when viewed either from behind or before the animal, indicates the opposite properties of a round bone. The whole bones in the carcass should bear a small proportion in bulk and weight to the flesh, the bones being only required as a support to the flesh. The texture of the bone should be small grained and hard. The bones of the head should be fine and clean, and only covered with skin and muscle, and not with lumps of fat and flesh, which always give a heavy-headed, dull appearance to an ox. The fore-arm and hock should be clean and full of muscle, to endure travelling. Large joints indicate bad feeders. The neck should be small from the middle to the head. A full, clear, and prominent eye, is a nice indication of good breeding, and an excellent index of many properties in the ox. A dull heavy eye unmistakeably indicates a slow feeder. A rolling eye, showing much white, is expressive of a restless, capricious disposition, which is incompatible with quiet feeding. A cheerful clear eye accompanies good health; a dull one indicates the probable existence of some internal lingering disease; the dullness of eye, however, arising from internal disease is of a totally different character from a natural or constitutional phlegmatic dullness. The next point to be ascertained is the *state of the skin*. A thick firm skin, which is generally covered with a thick-set, hard, short hair, always feels hard to the touch, and indicates a bad feeder. A thin, meagre, papery skin, covered with thin silky hair is indicative of weakness of constitution, though of good feeding properties. A perfect skin is thick and loose, floating, as it were, on a layer of soft fat, yielding to the least pressure, and springing back to the finger, like a piece of soft, thick chamois leather; it is also covered with thick glossy soft hair. The other greatest points are, that the head should be small and set on the neck, as if easily carried by the animal. The face long from the eyes to the point of the nose. The skull broad across the eyes, contracted a little above them, but tapering considerably below them to the nose. The muzzle fine and small; the nostrils capacious; the ears large, slightly erect, and transparent; the neck short and light. A droop of the neck from the top of the shoulder to the head indicates weakness of constitution. The legs below the knees should be rather short than long, and clean made. The tail rather thick than otherwise, and provided with a large tuft of long hair. The *position of the flesh* is important: that part called the spare rib, or the fore and middle ribs

should be well covered. The division between the horns called the closing, should be characterized by a thick layer of fat, a thick flank, and a full neck bend. The last points are the shoulder joint and shoulder, and if these parts are well covered, the animal may be considered matured. When the frame of a short horn ox is scrutinized, it will be found to present a straight level back from behind the horns to the top of the tail, full buttocks, and a projecting brisket. There is also the level loin across the hook-bones, the level top of the shoulder across the ox, and perpendicular lines down the hind and fore legs on both sides; these constituting the square forms when the ox is viewed before and behind. There are also parallel lines from the sides of the shoulders, along the outmost points of the ribs, to the sides of the hind quarters; and these lines are connected at their ends by others of shorter and equal length, across the end of the rump and the top of the shoulder; thus constituting the rectangular form of the ox when viewed from above down upon the back. It may be pretty accurately asserted, that the carcass of a full-fed, symmetrical, short-horn ox, included within the rectangle, is in length double its depth, and in depth equal to its breadth.

Cure for Horn Ail or Hollow Horn.—This disorder usually attacks cattle in the spring, after a severe winter; likewise those that are in poor flesh, or those that have been overworked and exposed to severe storms, or reduced by other diseases, are pre-disposed to take it. Symptoms—eyes dull, discharging yellow matter, dizziness, loss of appetite, shaking of the head, bloody urine, coldness of the horns, stupidity, and great debility. *Cure.*—Split the tail up two or three inches, take one quarter pound of black pepper, and a handful of fine salt, and bind on the tail. This is a sure cure.

To Extract Rancidity from Butter.—Take a small quantity, that is wanted for immediate use. For a pound of the butter dissolve a couple of teaspoonfuls of saleratus in a quart of boiling water, put in the butter, mix it well with the saleratus water, and let it remain till cold, then take it off carefully, and work a teaspoonful of salt into it. Butter treated in this manner answers very well to use in cooking.

Eye Water for Horses and Cattle.—Alcohol, 1 tablespoonful; extract of lead, 1 teaspoonful; rain water, ½ pint.

Cure for Foot Rot in Sheep.—Take two pounds of blue vitriol; three-fourths of a pound of verdigris; one pint of spirits of turpentine; four quarts of chamber lye; simmer well together, take all the sheep, pare the foot so as to be sure to get all the infection out, then stand them in this so as to have it cover the feet. Repeat this two or three times, and a cure will be effected.

To Improve the Wool of Sheep, by Smearing.—Immediately after the sheep are shorn, soak the roots of the wool that remains all over with oil, or butter, and brimstone; and, three or four days afterwards, wash them with salt and water. The wool of next season will not be much finer, but the quantity will be in greater abundance. It may be depended upon, that the sheep will not be troubled with the scab or vermin that year. Salt water is a safe and effectual remedy against maggots.

To Increase the Flow of Milk in Cows.—Give your cows three times a day, water slightly warm, slightly salted, in which bran has been stirred at the rate of 1 qt. to 2 gals. of water. You will find if you have not tried this daily practice, that the cow will give 25 per cent. more milk, and she will become so much attached to the diet that she will refuse to drink clear water unless very thirsty, but this mess she will drink at almost any time, and ask for more. The amount of this drink necessary is an ordinary water-pail full each time, morning, noon, and night. Avoid giving cows "slops," as they are no more fit for the animal than the human.

To Keep Eggs Several Months.—It is a good plan to buy eggs for family use when cheap, and preserve them in the following manner: Mix half a pint of unslaked lime with the same quantity of salt, a couple of gal-

lons of water. The water should be turned on boiling hot. When cold, put in the eggs, which should be perfectly fresh, and care should be taken not to crack any of them—if cracked, they will spoil directly. The eggs should be entirely covered with the lime-water, and kept in a stone pot, and the pot set in a cool place. If the above directions are strictly attended to, the eggs will keep good five months. The lime water should not be so strong as to eat the shell, and all the eggs should be perfectly fresh when put in, as one bad one will spoil the whole.

THORLEY'S CONDIMENTAL FOOD.—The following is a formula to make 1 ton of the food: Take of Indian meal 900 lbs., locust beans finely ground 600 lbs., best linseed cake 300 lbs., powdered turmeric and sulphur of each 40 lbs., saltpetre 20 lbs., licorice 27 lbs., ginger 3 lbs., anise-seed 4 lbs., coriander and gentian, of each 10 lbs., cream of tartar 2 lbs., carbonate of soda and levigated antimony each 6 lbs., common salt 30 lbs., Peruvian bark 4 lbs., fenugreek 22 lbs., mix thoroughly.

TO PRESERVE HERBS.—All kinds of herbs should be gathered on a dry day, just before, or while in blossom. Tie them in bundles, and suspend them in a dry, airy place, with the blossoms downwards. When perfectly dry, wrap the medicinal ones in paper, and keep them from the air. Pick off the leaves of those which are to be used in cooking, pound and sift them fine, and keep the powder in bottles, corked up tight.

MUCH BUTTER FROM LITTLE MILK.—Take 4 ozs. pulverized alum, ½ oz. pulverized gum-arabic, 50 grs. of pepsine; place it in a bottle for use as required. A teaspoonful of this mixture added to 1 pt. of new milk will, upon churning, make 1 lb. of butter. Agents are selling this secret for $25.

TO MAKE SALT BUTTER FRESH.—When butter has too much salt in it, put to each pound of it a quart of fresh milk, and churn it an hour; then treat it like fresh butter, working in the usual quantity of salt. A little white sugar worked in, improves it. This is said to be equal to fresh butter. Salt may be taken out of a small quantity of fresh butter, by working it over, in clean fresh water, changing the water a number of times.

CHURNING.—In churning butter, if small granules of butter appear which do not "gather," throw in a lump of butter and it will form a nucleus and the butter will "come."

A MODE OF PREPARING AND PRESERVING BUTTER.—After the cream is placed in the churn, pour by small portions at a time, agitating the while, sufficient lime-water to destroy the acidity. Churn until the butter is separated; it will not collect in lumps; pour off the butter-milk and churn till it is all collected. More butter will be obtained and it will keep much longer.

TO PROTECT FRUIT-TREES FROM ATTACKS OF MICE, ETC.—Tar, 1 part; tallow, 3 parts; mix. Apply hot to the bark of the tree with a paint brush.

SHEEP-DIPPING COMPOSITION.—Water, 1 gal.; benzine, 8 ounces; cayenne pepper, 2 ounces. Mix; make what quantity you require, using these proportions. Dip your sheep and lambs in the composition, and it will make short work of the vermin.

NEW METHOD OF PLANTING CORN.—Corn soaked in tar-water and then rolled in plaster will yield more, be of a better color, and ripen sooner, and will not be disturbed by birds or worms.

TO PRESERVE TIMBER.—It is said that if one pound of sulphuric acid is mixed with forty pounds of water, timber immersed therein will not rot, and that the underground portion of posts will last for many more years for being so treated.

TO DRY HERBS.—Select the shoots just as the flowers form and show color, but before they expand; suspend them in an airy situation, under cover, not exposed to the sun.

TO SPROUT ONIONS.—Pour hot water on the seed, let it remain 2 or 3 seconds, and they will immediately sprout, and come up much earlier.

CULTIVATION OF BLACKBERRIES.—If any reader is making his first experiment in the culture of blackberries, let me give him a word of advice,

to wit, that he try mulching instead of hoeing the plants. If, however, he has a large lot of them, set in rows so that a horse cultivator can be used between them, it may be best to cultivate and hoe. But for small patches I think mulching is better for keeping down the weeds and keeping the soil cool and loose round the plants. I used to try hoeing, but the rows were very near together so I could not use a cultivator, and I found in a short time I had gotten hold of a bad job. Wherever I cut a root with my hoe there a shoot would spring up, and very soon I had three plants where there was room but for one. Becoming disgusted with this method of culture I took up my plants and decided to mulch instead of hoeing. Old hay or straw costs but little, will keep down weeds and promote the growth of the plants. Let those who have been in the habit of hoeing give mulching a trial.

To Burn Lime Without a Kiln.—Make a pyramidal pile of large limestones, with an arched furnace near the ground for putting in the fuel, leaving a narrow vent or funnel at the top; now cover the whole pile with earth or turf, in the way that charcoal heaps are covered, and put in the fire. The heat will be more completely diffused through the pile, if the aperture in the top is partially closed. Produces a superior article of lime.

Cure for Scab or Itch in Sheep.—Take sulphur, two ounces; powdered sassafras, one ounce; honey sufficient to make into a paste. Dose, a tablespoonful every morning. Use, at the same time, a wash made of one gill pyroligneous acid, and one quart of water, mixed. Apply with a sponge. If a few applications do not remove the difficulty take half-pint fir balsam, and one ounce sulphur, well mixed, and anoint the sores daily. A single sheep infected is sufficient to infect a whole flock.

How to Form Springs.—The finest springs can be made by boring, which is performed by forcing an iron rod into the earth by its own weight, turning it round, and forcing it up and down by a spring-pole contrivance. The water will sometimes spout up several feet above the surface. Iron pipes are put down in the hole after the water is found. Depressed situations, having a southern exposure, with rising ground towards the north, are the best situations in the United States or the Canadas to find water.

Cure for Mange in Cattle.—Make a wash of four ounces pyroligneous acid and one pint of water. Apply daily. At the same time, take two ounces powdered sassafras, a handful powdered charcoal, and one ounce of sulphur. Mix well together, and divide into six parts; one to be given in the feed night and morning. As the mange is infectious, the cattle troubled with it should be removed from the rest of the herd.

Food For Singing Birds.—Blanched sweet almonds, pulverized, ½ lb.; pea meal, 1 lb.; saffron, 3 grs.; yolks of two hard boiled eggs. Reduce all to a powder by rubbing through a sieve. Place the mixture in a frying pan over a fire, and add 2 oz. butter, and 2 oz. honey. Slightly cook for a few minutes, stirring well, then set off to cool, and preserve in a closely corked bottle.

When Grain Should be Cut.—A most important question for the farmer. Careful observation and some little experience, during twenty years residence in a great wheat-growing country, have convinced the writer that fully ten per cent. is saved on the crop to the farmer to cut his wheat before the grain is fully ripe. Our rule is to commence cutting as soon as the earliest part of the crop has passed from the milky into the dough state. There is no occasion to let it lay to cure when cut while the straw is still partially green. Bind it up as fast as cut, and set the bundles in stocks. "Dutch fashion;" set in this way, the most unripe grain will cure and perfect itself.

Composition for Driving Out Rats, etc.—Keep on hand a quantity of chloride of lime. The whole secret consists in scattering it dry all around their haunts and into their holes, and they will leave at once, or a liberal decoction of coal tar placed in the entrance of their holes will do as well.

Cure for Cholic in Cattle.—Take powdered aniseed, half teaspoonful; powdered cinnamon, half teaspoonful. Mix, and give in a quart of spear mint tea. Repeat, if necessary.

Another.—If the animal suffers much pain, apply fomentations to the belly, and give the following injection: Powdered ginger, half ounce; common salt, one tablespoonful; hot water, one gallon.

To Dissolve Large Bones for Manure without Expense.—Take any old flour barrel, and put into the bottom a layer of hardwood ashes; put a layer of bones on the top of the ashes, and add another layer of ashes, filling the space between the bones with them; then add bones and ashes alternately, finishing off with a thick layer of ashes. When your barrel is filled, pour on water (urine is better), just sufficient to keep them wet, but do not on any account suffer it to leach one drop; for that would be like leaching your dungheap. In the course of time they will heat, and eventually soften down so that you can crumble them with your finger. When sufficiently softened, dump them out of the barrel on a heap of dry loam, and pulverize and crumble them up till they are completely amalgamated into one homogeneous mass with the loam, so that it can be easily handled and distributed when required. You may rely upon it, this manure will leave its mark, and show good results whenever used.

Substitute for Superphosphate.—If you have inch bone ground in a bone-mill, and cannot afford to purchase sulphuric acid to work it up into superphosphate of lime, you can reduce your bones into a fine impalpable powder by simply using three barrels of loamy soil to every barrel of inch bones; mix them together. The bones will soon begin to heat and ferment, and continue so for some time; they will then cool off. You will then proceed to chop down and pulverize and work the mass thoroughly; it will begin to reheat and ferment and cool down again; and you will continue working it over till the contents are brought to the proper state of fineness, when you will have a fertilizer of astonishing power. It is only a year or two since a statement appeared in the "Country Gentleman," of the experiments of a Mr. Haskell, with a manure prepared after this method, who found it even superior to superphosphate of lime,

Fish Compost, Substitute for Bone-Dust, Manure from Fish Refuse, &c.—The fish owes its fertilizing value to the animal matter and bone-earth which it contains. The former is precisely similar to flesh or blood, consisting of 25 per cent. of fibrin, the rest being water; and their bones are similar in composition to those of terrestrial animals. As fertilizing agents, therefore, the bodies of the fishes will act nearly in the same way as the bodies and blood of animals; 100 lbs. in decaying, produces 2½ lbs. of ammonia. Hence 400 lbs. of fish rotted in compost are enough for an acre. The great effect is due to the ammoniacal portion; for it renders the herbage dark-green, and starts it very rapidly. One of the best composts is made as follows; Dried bog-earth, loam, or peat, seven barrels; hardwood ashes, two barrels; fish, one barrel; slaked lime, one bushel. Place a thick layer of bog-earth on the bottom; on the top of this put a layer of the fish, then a sprinkling of lime, then a layer of ashes; on the top of the ashes put a thick layer of bog-earth, loam or peat; then another thin layer of fish, lime, and ashes, and so on till your materials are worked in; then top off with a thick layer of the absorbents, to retain the fertilizing gases. The decomposition of the fish will proceed very rapidly, and a very rich compost will be the result. It should be shovelled over and over and thoroughly intermixed and pulverized. Put this on so as to have 400 lbs. of fish to the acre. It may be applied with the greatest benefit to corn, turnips, potatoes, beans, etc., in the drill, and broad cast on the grass.

Superphosphate can be made from pogy-chum, or the refuse of other fish, after the oil is expressed by dissolving in sulphuric acid, and afterwards mixing with dry loam, precisely as directed for making superphosphate with bones. Whale-oil or the oil of any fish, when made into a compost with loam, and a little lime or wood ashes, yields a very powerful manure, merely

mixed with absorbent earth, and applied at the end of the month. Impure whale-oil, at the rate of 40 gallons per acre, has produced a crop of 23¼ tons of turnips per acre; while on the same soil, and during the same season, it took 40 bushels of bone-dust to produce only 22 tons per acre.

Superphosphate in Twenty-four Hours.—Any farmer who has got an apparatus for steaming food for cattle can make superphosphate in quick style by admitting steam from the boiler into the barrel containing the water, acid, and ground bones. The heat thus generated quickens the dissolution of the bones in a wonderful manner; and, if the process is properly conducted, it will not take over twenty-four hours in any case. It is indispensable that the barrel be tightly covered to retain the steam.

The Tuberose.—To cultivate the tuberose, that most beautiful of all plants, put the bulbs in six-inch pots, three in each, and use a mixture of equal parts turfy loam, peat, and leaf mould, and place in the pit. Give very little water at first, and as they commence to grow freely increase it and keep near the glass. When they begin to push up their flower-spikes they will of necessity require to be placed where they will have sufficient space for the proper development of the tall spikes. These will come into bloom from August to October, when they will require a temperature ranging from 60° to 70°, the latter being preferable. If wanted to bloom earlier, the pots should be placed in a warm pit, and on a hot-bed, the temperature of which is about 75 degrees, to start them into growth more quickly.

Arranging Flower Beds.—A few simple rules in the arrangement of flower beds may materially enhance the effect produced. Among these are: (1.) Avoid placing rose-colored next to scarlet, orange or violet. (2.) Do not place orange next to yellow, or blue next to violet. (3.) White relieves any color, but do not place it next to the yellow. (4.) Orange goes well with blue, and yellow with violet. (5.) Rose color and purple always go good together.

Coloring for Cheese.—The coloring for cheese is, or at least should be, Spanish annatto; but, as soon as coloring became general in this country, a color of an adulterated kind was exposed for sale in almost every shop. The weight of a guinea and a half of real Spanish annatto is sufficient for a cheese of fifty pounds' weight. If a considerable part of the cream of the nights' milk be taken for butter, more coloring will be requisite. The leaner the cheese is, the more coloring it requires. The manner of using annatto is to tie up in a linen rag the quantity deemed sufficient, and put it into ½ pt. of warm water over night. This infusion is put into the tub of milk in the morning with the rennet infusion; dipping the rag into the milk, and rubbing it against the palm of the hand as long as any color runs out. The yolk of egg will color butter.

Oat or Wheat Straw made equal to Hay.—Bring 10 gallons water to a boiling heat; take it off the fire, and add to it at once 3 gallons of linseed unground; let it remain till it gets cold; then empty the whole into a cask containing 44 gallons of cold water, and let it remain for forty-eight hours. At the end of that time, it will be reduced into a thin jelly, like arrowroot. Spread out ½ ton straw, and sprinkle it over regularly with the whole of the liquid from the cask. The stock will eat it up as clean, and keep as fat on it, quantity for quantity, as they would do on hay.

To Destroy the Moth or Miller.—Dr. Waterman says: "I took two white dishes (because white attracts their attention in the night) or plates, and placed them on the top of the hives, and filled them about half-full of sweetened vinegar. The next morning I had about 50 millers caught; the second night I caught 50 more; the third night being cold, I did not get any, the fourth night being very warm, I caught about 400; the fifth night I got about 200."

How to double the usual Quantity of Manure on a Farm.—Provide a good supply of black swamp mould or loam from the woods, within easy reach of your stable, and place a layer of this one foot thick, under each horse, with litter as usual, on the top of the loam or mould. Remove

the droppings of the animals every day, but let the loam remain for two weeks; then remove it, mixing it with the other manure, and replace with fresh mould. By this simple means, any farmer can double not only the quantity but also the quality of his manure, and never feel himself one penny the poorer by the trouble or expense incurred, while the fertilizing value of the ingredients absorbed and saved by the loam can scarcely be estimated.

Josiah Quincy, jun., has been very successful in keeping cattle in stables the year through, and feeding them by means of soiling. The amount of manure thus made has enabled him to improve the fertility of a poor farm of 100 acres, so that in twenty years the hay crop had increased from 20 to 300 tons. The cattle are kept in a well-arranged stable, and are left out in the yard an hour or two morning and afternoon; but they generally appear glad to return to their quarters. By this process, one acre enables him to support three or four cows. They are fed on grass, green oats, corn fodder, barley, etc., which are sown at intervals through the spring and summer months, to be cut as required; but he remarks that his most valuable crop is his manure crop. Each cow produces 3½ cords of solid, and 3 cords of liquid manure, or 6½ cords in all. Five to eight miles from Boston, such manure is worth five to eight dollars a cord. From this estimate, he has come to the conclusion that a cow's manure may be made as valuable as her milk.

Home-made Poudrette.—Few fertilizers are wasted with the prodigality of extravagance which attends the use of night soil, while the exercise of a little care and attention is all that is required to secure one of the most powerful fertilizers in existence. Night soil contains phosphate of lime, which is essential to the growth of animals' bones, and which is not supplied from the atmosphere like carbonic acid, and ammonia. In order to receive the droppings in a manageable and inoffensive state, the vault should be provided with a large, tight box made of matched plank, placed to slide on scantling, so that it can be drawn out by attaching a horse, whenever required. Provide plenty of dry, black loam from the woods or swamps; refuse charcoal, dry peat, or alluvial deposits answer first-rate. Keep them dry, in barrels or boxes on the spot, under cover; spread a thick layer on the bottom of the receiving box, and at intervals of a few days throw in a liberal supply of these absorbents on the accumulating deposit. If a few handfuls of plaster are thrown in occasionally, it will suppress unpleasant odors and increase the value of the manure. The emptying of slops and dish water in the box should be strictly prohibited. When the box is filled you can remove it, and convert it into poudrette. For this purpose it must be worked over with an additional quantity of muck, or other absorbent, in such proportions that it will form, with what has been previously added, about three-quarters of the entire compound. The working should be done under a shed, and the whole be kept perfectly dry. It should be shoveled over and mixed several times at intervals, and finally screened, and made as uniform throughout as possible; the finer it is pulverized, and the drier it is kept, the better.

Packing Fruits for Long Distances.—Take a box of the proper size, soft paper, and sweet bran. Place a layer of bran on the bottom, then each bunch of grapes is held by the hand over a sheet of the paper; the four corners of the paper are brought up to the stalk and nicely secured; then laid on its side in the box, and so on until the first layer is finished. Then dust on a layer of bran, giving the box a gentle shake as you proceed. Begin the second layer as the first, and so on until the whole is full. The bloom of the fruit is thus preserved as fresh, at the end of a journey of 500 miles, as if they were newly taken from the tree. Never fails to preserve grapes, peaches, apricots, and other fruit.

To Renew Old Orchards.—Early in the spring, plough the entire orchard, and enrich the whole soil with a good dressing of compost of manure, swamp-muck, and lime; scrape off the old bark with a deck-scraper,

or a sharp hoe; apply half a bushel of lime, and the same of ground charcoal round each tree. Then apply diluted soft soap, or strong soap suds, on the trunks and limbs, as high as a man can reach. When the trees are in full bloom, throw over them a good proportion of fine slaked lime, and you will reap abundant fruits from your labors.

To Destroy Caterpillars' Eggs.—Caterpillars' eggs in apple orchards, which during the month of April form small rings on the last year's shoots, should be cut off and burned, every one of which, if left, will form a large nest, and strip all the leaves on the branch which holds it.

Draining Orchards.—Apple orchards, on heavy soils or wet subsoils, are often injured in growth and in crops. Draining by running ditches with tile midway between the rows, will do them much good. As the operation must cut off many of the small roots, it should be performed in spring before the buds open; if left till the trees are in leaf, it will more or less check their growth.

Early Potatoes.—Potatoes may be planted as soon as the frost is out of the ground, and will not be injured if the white frost does come after they are up. We make a gain of at least one week in the early garden potatoes, by starting them in the end of a hot-bed, setting them out in rows in open ground after they are furnished with green leaves. In one case a white frost cut the tops afterwards, but there were enough left for the plants to grow and give a good crop. They might be protected by newspapers when frost is threatened. The cut pieces were placed in contact in the hot-bed, and buried an inch or two in depth.

Two horses may be made to draw unequal portions of a load, by dividing the bar attached to the carriage in such a manner that the weaker horse may draw upon the longer end of it.

Foot Ointment (for all domestic animals).—Equal parts of tar, lard and resin, melted together.

Ashes from Soil by Spontaneous Combustion.—Make your mound 21 feet long by 10½ feet wide. To fire, use 72 bushels of lime. First a layer of dry sods or parings on which a quantity of lime is spread, mixing sods with it; then a covering of eight inches of sods, on which the other half of the lime is spread, and covered a foot thick, the height of the mound being about a yard. In twenty-four hours it will take fire. The lime should be fresh from the kiln. It is better to suffer it to ignite itself than to effect it by the operation of water. When the fire is fairly kindled, fresh sods must be applied; but get a good body of ashes in the first place. I think it may be fairly supposed that the lime adds full its worth to the quality of the ashes, and, when limestone can be got, I would advise the burning a small quantity in the mounds, which would be a great improvement to the ashes, and would help to keep the fire in.

Remedy for Curculio in Fruit Trees.—Sawdust saturated in coal oil and placed at the roots of the tree, will be a sure preventive; or, clear a circle around the tree from all rubbish; fill up all little holes and smooth off the ground for a distance of at least 3 feet each way from the tree, then place chips or small pieces of wood on the ground within the circle; the curculio will take refuge in large numbers below the chips, and you can pass around in the mornings and kill them off.

Mr. Culley's Red Salve, to cure the Rot in Sheep.—Mix 4 oz. of the best honey, 2 oz. of burnt alum reduced to powder, and ½ a pound of Armenian bole, with as much train or fish oil as will convert these ingredients into the consistence of a salve. The honey must first be gradually dissolved, when the Armenian bole must be stirred in; afterwards the alum and train-oil are to be added.

The Great Secrets for Trapping Foxes and other Game.—Musk-rat musk and skunk musk mixed. Can be procured at the druggists, or from the animals themselves. To be spread on the bait of any trap. This receipt has been sold as high as $75. *Another, costing $50, for mink, &c.*—Unslaked lime, ½ lb.; sal-ammoniac, 3 oz., or muriate of ammonia, 3 oz.

Mix, and pulverize. Keep in a covered vessel a few days until a thorough admixture takes place. Sprinkle on the bait, or on the ground around the trap. Keep in a corked bottle.

To Keep Vegetables through the Winter.—Succulent vegetables are preserved best in a cool, shady place, that is damp. Turnips, Irish potatoes, and similar vegetables, should be protected from the air and frost by being buried up in sand, and in very severe cold weather covered over with a linen cloth. It is said that the dust of charcoal, sprinkled over potatoes will keep them from sprouting. I have also heard it said, that Carolina potatoes may be kept a number of months, if treated in the following manner: Take those that are large, and perfectly free from decay—pack them in boxes of dry sand, and set the boxes in a place exposed to the influence of smoke and inaccessible to frost.

A Cheap Method of Preserving Cucumber Plants from the Small Fly or Bug.—Break off the stalks of onions which have been set out in the spring, and stick down five or six of them in each hill of cucumbers, and the bug will immediately leave them. It would be well, after a few days, to renew them; but one application has frequently been found to be completely effectual.

Grafting Wax.—Five parts of resin; one part of beeswax; one part of tallow. Melt these in a skillet, tin cup or any metal vessel; the skillet being preferable, as it can be handled better, and the wax keeps warm longer in it. Melt these over the fire and mix together well. When the scions are set---say as many as twenty or thirty, or as few as are wished—have the mixture ready and apply it warm, with a small wooden paddle. See that every part is covered and the air completely excluded. It requires no bandage.

To Prevent Decay of Farm Implements.---When not in use have them sheltered from the sun, wind, rain, and snow. By this means, sleighs, wagons, carts, ploughs, threshing-machines, harrows, and the like, would last twice as long as they would if left in the open air, swelling from moisture one week, and shrinking the next from the influence of the sun and wind.

To Cleanse Wool.---Make a hot bath composed of water 4 parts, urine 1 part, enter the wool, teasing and opening it out to admit the full action of the liquid; after 20 minutes' immersion, remove from the liquid and allow it to drain, then rise it in clean running water, and spread out to dry. The liquid is good for subsequent operations, only keep up the proportions, and use no soap.

Live Stock.---Different kinds of stock should be kept separate, both in the fields and yards. Heavy losses are always occurring from allowing horses, cows, sheep, pigs and fowls to run in one yard. Horses in their play will kick or scare cows, and a cow near her time may lose the calf in consequence; cows will hook sheep; pigs will kill and eat lambs and chickens; and small stock are trodden on by the heaviest animals. In the arrangement of the yards for winter this should be thought of, and plenty of room given each kind of stock by itself.

To Mark Sheep without Injury to the Wool.—To 30 spoonfuls of linseed oil, add 2 oz. of litharge, 1 oz. of lampblack; boil all together, and mark the sheep therewith.

Underground Draining and Subsoil Plowing prevent ground from ever becoming too wet or too dry. The draining and loosening the earth admits the air; the coldness of the earth condenses the air in the same manner that a pitcher containing ice-water does in warm weather. By this method air is also supplied to the roots of plants, which is equally important. No farmer should delay a single season to commence this most important branch of agricultural economy.

To Free Barns and Out-houses from Mites and Weevils.---Let the walls and rafters, above and below, of such granaries be covered completely with quicklime, slacked in water, in which wormwood, hyssop, and nux

vomica should be previously boiled. Apply this composition as hot as possible.

Sheep Ticks---May be destroyed with the decoction of lobelia seed, made as above.

Home-made Guano of Unequalled Excellence.---Save all your fowl manure from sun and rain. To prepare it for use, spread a layer of dry swamp muck (the blacker it is the better) on your barn floor, and dump on it the whole of your fowl manure; beat it into a fine powder with the back of your spade; this done, add hard wood ashes and plaster of Paris, so that the compound shall be composed of the following proportions: dried muck, 4 bushels; fowl manure, 2 bushels; ashes, 1 bushel; plaster, 1½ bushels. Mix thoroughly, and spare no labor; for, in this matter, the elbow-grease expended will be well paid for. A little before planting, moisten the heap with water, or better still, with urine; cover well over with old mats, and let it lie till wanted for use. Apply it to the beans, corn, or potatoes, at the rate of a handful to a hill; and mix with the soil before dropping the seed. This will be found the best substitute for guano ever invented, and may be depended on for bringing great crops of turnips, corn, potatoes, &c.

Twenty Dollars' Worth of Manure for Almost Nothing.—If you have any dead animal,—say, for instance, the body of a horse,—do not suffer it to pollute the atmosphere by drawing it away to the woods or any other out of the way place, but remove it a short distance only from your premises, and put down four or five loads of muck or sods, place the carcass thereon, and sprinkle it over with quick-lime, and cover over immediately with sods or mould sufficient to make, with what had been previously added, 20 good wagon-loads; and you will have within twelve months a pile of manure worth $20 for any crop you choose to put it upon. Use a proportionate quantity of mould for smaller animals, but never less than twenty good wagon-loads for a horse; and, if any dogs manifest too great a regard for the enclosed carcass, shoot them on the spot.

To Cultivate Tobacco.—To raise tobacco, select a sheltered situation, where the young plants can receive the full force of the sun; burn over the surface of the ground early in spring (new land is best), rake it well, and sow the seeds; have a dry, mellow, rich soil, and after a shower, when the plants have got leaves the size of a quarter-dollar, transplant as you would cabbage plants 3½ feet apart, and weed out carefully afterwards. Break off the suckers from the foot-stalks, as they appear; also the tops of the plants when they are well advanced,---say, about three feet high,---except those designed for seed, which should be the largest and best plants. The ripeness of tobacco is known by small dusky spots appearing on the leaves. The plants should then be cut near the roots, on the morning of a day of sunshine, and should lie singly to wither. When sufficiently withered, gather them carefully together, and hang them up under cover to cure and prepare for market.

Fertilizer for Tobacco.---Add 40 lbs. of the best Peruvian guano to each 100 lbs. of the superphosphate made by the above receipt, and you will have one of the most powerful fertilizers for tobacco that can be made. If you do not have Peruvian guano, use instead 30 lbs. of hen manure to each 100 lbs. of superphosphate.

Substitute for Barn-manure.---Dissolve a bushel of salt in water enough to slack 5 or 6 bushels of lime. The best rule for preparing the compost heap is, 1 bushel of this lime to 1 load of swamp-muck, intimately mixed; though three bushels to 5 loads makes a very good manure. In laying up the heap, let the layer of muck and lime be thin, so that decomposition may be more rapid and complete. When lime cannot be got, use unleached ashes,---3 or 4 bushels to a cord of muck. In a month or six weeks, overhaul and work over the heap, when it will be ready for use. Sprinkle the salt water on the lime as the heap goes up.

TABLE OF AVOIRDUPOIS POUNDS IN A BUSHEL,

As prescribed by Statute in the several States named.

COMMODITIES.	California.	Connecticut.	Delaware.	Illinois.	Indiana.	Iowa.	Kentucky.	Louisiana.	Maine.‡	Massachusetts	Michigan.	Minnesota.	Missouri.	N. Hampshire	New Jersey.	New York.	Ohio.	Oregon.	Pennsylvania.	Rhode Island	Vermont.	Washington T.	Wisconsin.
Barley	50			48	48	48	48	32		46	48	48	48		48	48	48	46	47		46	45	48
Beans				60	60	60	60						60			62							
Blue Grass Seed				14	14	14	14						14										
Buckwheat	40	45		40	50	52	52			46	42	42	52		50	48		42	48		46	42	42
Castor Beans				46	46	46							46										
Clover Seed				60	60	60	60				60	60	60		64	60	60	60				60	60
Dried Apples				24	25	24					28	28	24					28				28	28
Dried Peaches				33	33	33					28	28	33					28				28	28
Flax Seed				56	56	56	56						56		55	55	56						56
Hair				8					11														
Hemp Seed				44	44	44	44						44										
Indian Corn	52	56	56	52	56	56	56	56		56	56	56	52		56	58	56	56	56		56	56	56
Indian Corn in ear				70	68	68																	
Indian Corn Meal				48	50		50		50	50										50			
Mineral Coal*				80	70								80										
Oats	32	28		32	32	35	33⅓	32	30	30	32	32	35	30	30	32	32	34	32		32	36	32
Onions				57	48	57	57			52			57							50		50	
Peas																60							
Potatoes		60		60	60	60	60		60				60	60	60	60		60		60	60	60	60
Rye	54	56		54	56	56	56	32		56	56	56	56		56	56	56	56	56		56	56	56
Rye Meal									50	50										50			
Salt†					50	50	50						50			56							
Timothy Seed				45	45	45	45						45			44							46
Wheat	60	56	60	60	60	60	60	60		60	60	60	60		60	60	60	60	60		60	60	60
Wheat Bran				20		20	20						20										

* In Kentucky, 80 lbs. of bituminous coal or 70 lbs. of cannel coal make 1 bushel.
† In Pennsylvania, 8 lbs. coarse, 70 lbs. ground, or 62 lbs. fine salt make 1 bushel; and in Illinois, 50 lbs. common or 55 lbs. fine salt make 1 bushel.
‡ In Maine, 64 lbs. of ruta baga turnips or beets make 1 bushel.

WEATHER PROGNOSTICS FOR FARMERS AND OTHERS.—Persons in every position in society are led by motives of necessity or comfort to study the indications of the weather in the various appearances of the skies, the atmosphere, vegetation, &c. The most reliable indications of the weather are afforded by the formation and position of the *clouds*. When their elevation is very great; when their forms are small, well defined, thread-like, they indicate rain. When they become lower and denser, losing their curl-like form, and spread into long dark streaks, they indicate wind and rain, the near or distant approach of which may be sometimes estimated from their greater or less abundance and permanence. Sometimes the clouds present a dense structure, are formed in the lower atmosphere, and move along with the current which is next the earth. The formation of these clouds to leeward in a strong wind indicates the approach of a calm with rain. When they increase rapidly, and appear lower in the atmosphere, with their surfaces full of loose flues, they indicate rain. When they do not disappear or subside about sunset, but continue to rise, thunder may be expected. The sheet cloud is the lowest of the clouds, its inferior surface commonly resting on the earth or water. The sheet cloud has long been regarded as a prognostic of fine weather, and it is generally indicative of calmness. Wane clouds appear to arise from the subsidence of mare's tails to a horizontal position; but curl clouds do not always precede them. They are always thickest at one extremity, or in the middle. Their form and relative positions, when seen in the distance, frequently give the idea of a shoal of fish. At other times they appear like parallel bars, or interwoven

streaks like the grain of polished wood. They precede wind and rain. They are almost always seen in the interval of storms. Sonder clouds are usually formed by curl clouds collapsing as it were, and passing into small roundish masses, in which the thread-like texture of the curl is no longer discernible. These clouds are very frequent in summer, and attendant on warm and dry weather. They are occasionally seen in the intervals of showers, and in winter. The train cloud is formed in the interval between the first appearance of the fleecy pile cloud, and the commencement of rain, while the lower atmosphere is yet too dry; also during the approach of thunder-storms. The indistinct appearance of it is chiefly in the longer or shorter intervals of showers of rain, snow, or hail. Nimbus clouds are attended by, or productive of heavy showers, accompanied by lightning or storm. The nimbus generally spreads a sudden and almost impenetrable gloom over the horizon, in the direction from which the storm approaches. Although it is one of the least beautiful of the clouds, it is frequently superbly decorated with its attendant, the rainbow, which can only be seen in perfection when backed by the widely extended gloom of the storm cloud. The nimbus is known to be formed of two sheets of clouds, in different electrical states, and hence it is so commonly attended with thunder and lightning. Clouds in any of the preceding forms may increase so as to completely obscure the sky, and at times put on an appearance of density, which to the inexperienced observer, indicates the speedy commencement of rain. But before rain falls, the clouds are generally seen to undergo a change. These appearances, when the rain happens over our heads, are but imperfectly seen. We can then only observe, before the arrival of the lower or denser clouds, or through their interstices, that there exists at a greater altitude, a thin light veil, or at least a turbid haziness. When this has considerably increased, we see the lower clouds spread themselves till they unite at all points, and form a uniform sheet. The rain then commences and the lower clouds arriving from the windward, move under this sheet, and are successively lost in it. When the latter ceases to arrive, or when the sheet breaks, every one's experience teaches him to expect an abatement or cessation of rain. As the masses of clouds are always blended, and their arrangement destroyed before rain comes on, so the re-appearance of these is the signal for its cessation. The thin sheets of cloud, which pass over during a wet day, receive from the humid atmosphere a supply proportionate to their consumption, while the latter prevents their increase in bulk. Hence it will sometimes rain for a long time without any apparent alteration in the state of the clouds.

The sun appearing whitish or ill-defined and setting in the midst of a haze, betokens rain. A morning sun rising surrounded by a bright and lurid sky, is an indication of rain, because, rising in the east, it shines directly on the rain falling in the west, and thereby foretells approaching wet weather with this humid wind. But the sun setting in the midst of a bright light is a symptom of fine weather, because when the sun sinks in the west, its rays fall on the rain in the east, whence the storm is departing. If, also, the sun's rays appear like horns---if shorn of his rays, or if he goes down into a bank of clouds in the horizon, inclement weather is to be expected.

The moon is another well-known indicator of the weather. If it looks pale and dim, we may expect rain; if red, wind; and if of its natural color, with a clear sky, fair weather. Generally speaking, if the moon is rainy throughout, it will clear at the change, and the rain will probably return in a few days subsequently. If fair throughout, with rain at the change, the fair weather will probably return on the fourth or fifth day.

The wind exerts the chief influence over the atmospheric condition which produces rain. Thus, if the winds blow from, instead of to a hilly country, the clouds will be carried elsewhere, and be precipitated in lower regions at a distance. But if the low-lying regions be warm, the clouds will be radiated, and their particles in a refined state, will be carried onward by

the wind, till they come over a cold high-lying country, where they will drop in heavy showers. The direction of the wind must evidently effect the state of the weather; if it come to us after blowing over a large surface of land, it will not be overcharged with moisture, and there will be dry weather; whereas, if the wind come from the ocean, it will bring the vapors of the ocean with it, and of course, frequently moist weather. Cold and warm weather, too, depend much upon the direction of the wind. As it blows from the cold regions of the north, or the warm and sunny districts of the south, most persons are sensible of the changes then produced, and will expect cold or warm, dry or wet weather, as the wind veers round to any of these points. But beyond these general laws, speculations on the chance falling of rain are exceedingly hazardous, in consequence of the variability of the winds, and the conditions of the atmosphere at points far beyond our knowledge. In all countries, however, particular winds are noted for being accompanied either by wet or dry weather; thus, the south and south-east winds bring much moisture, while those from the north and north-east are cold, dry and penetrating. Not only does this arise from the immense surface of ocean over which these winds sweep south of the equator, but from these southerly winds being of a higher temperature, whereby they hold a greater quantity of vapor in suspension or solution, the condensation of which must be proportionately greater, on arriving in this colder climate. Accordingly it has been observed that the wind will turn from the north to the south quietly, and without rain; but on returning from the south to the north, will blow hard, and bring much rain. Again, if it begin to rain from the south, with a high wind for two or three hours, and the wind falls, but the rain continues, it is likely to rain for twelve hours or more, and does usually rain until a strong north wind clears the air. For the same reason, winds from the west and south-west are considered to bring with them wet weather.

The seasons as at present existing, afford indications of what their followers will probably be. Thus, a moist autumn with a mild winter, is generally followed by a cold and dry spring, which greatly retards vegetation. If the summer be remarkably rainy, it is probable that the ensuing winter will be severe; for the great evaporation will have carried off too much heat from the earth. Wet summers are generally attended with an unusual quantity of seeds on the white-thorn and dog rose bushes; hence the unusual fruitfulness of these shrubs betokens a severe winter; the cause being the moisture of the earth, and the consequent coldness by evaporation. When it rains plentifully in May, it will rain but little in September, and the reverse. When the wind is south-west during the summer or autumn, and the temperature of the air unusually cold for the season, both to the feeling and the thermometer, with a low barometer, much rain may be expected. A rainy winter predicts a cold spring, and therefore an unproductive year. The March winds causing great evaporation of moisture from wet soil, chill it so much that it is in a bad state for vegetation, and the crops must suffer accordingly. If, therefore, much or frequent rain falls in winter, the above-mentioned bad consequences will follow; whereas, if the winter had been dry, the injurious process of excessive evaporation in the following spring would not be undergone by the soil. When there has been no storm before or after the vernal equinox, the ensuing summer is generally dry. When a storm happens from an easterly point on the 19th, 20th or 21st of March, the succeeding summer is generally dry. When a storm arises on the 25th, 26th, or 27th of March (and not before), in any point, the succeeding summer is generally dry. If there be a storm at south-west, or west-south-west, on the 19th, 20th, 21st, or 22nd of March, the succeeding summer is generally wet.

The animal creation affords many indications of the forthcoming weather. The low flight of swallows is a sign of approaching rain. The cause of this is, that they pursue flies, which delight in warm air; and these flies escaping from the excess of moisture above descend nearest to

the surface of the earth, and are there pursued by these birds. The appearance of cranes and other birds of passage early in autumn announces a very severe winter, for it is a sign that winter has already begun in the northern countries. Ducks, geese, and other water-fowl, before the approach of rain, may be seen to throw water with their bills over their backs, and dive frequently, the cause of which is, that although so much in the water they do not like being wetted to the skin; to avoid which, when warned by the peculiar sensation foretelling rain, they close their plumage together, by throwing a sudden weight of water upon their bodies, in the direction of the growth of their feathers. Cattle, before the approach of rain, may be seen stretching out their necks, and snuffing in the air with distended nostrils, which doubtless is occasioned by the odors of plants being more powerful than usual when the air is saturated with an excess of moisture. Dogs closely confined in a room, become drowsy and stupid before rain; the same is observed of cats in a less degree; horses neigh much; donkeys bray; cattle low; the fallow-deer becomes restless; and many other animals from the uneasiness they feel, owing to the altered condition, prognosticate the approach of rain. Insects being very sensible of every change in the state of the atmosphere, are good weather guides; hence, fine weather may be predicted when many spider's webs are seen in the open air; also when bees are found far beyond their hives. On the contrary, when spiders remain hidden, and bees do not range abroad as usual, rain may be expected.

Many plants and flowers are excellent indicators of atmospheric changes. The opening and shutting of some flowers depend not so much on the action of light as on the state of the atmosphere, and hence their opening and shutting betoken change. The common chickweed or stitch-wort may be considered as a natural barometer; for if the small upright flowers are closed, it is a certain sign of rain. During dry weather they expand freely, and are regularly open from nine in the morning till noon. After rain they become pendent, but in the course of a few days they again rise. The purple sandwort is another indicator of the weather; its beautiful pink flowers expand only during the sunshine, and close at the approach of rain. The pimpernel has been justly named "the poor man's weather glass." When its small brilliant red flowers are widely extended in the morning, a fine day may be expected; on the contrary, it is a certain sign of rain when the delicate petals of the flowers are closed. If the Siberian sow-thistle shuts at night, the ensuing day will be fine, and if it opens, the weather will be cloudy and rainy. When the African marigold remains closed after seven o'clock in the morning or evening, rain may be expected. The stalks of the trefoil swell and grow more upright previous to rain, and the speedwell, so universal a favorite in every hedgerow, closes its blue corolla before rain comes on, opening again when it ceases.

Natural phenomena serve in a variety of ways to foretell the weather. Thus, when mountain ranges or distant objects appear nearer to us than usual, when sounds are heard more clearly from a distance, when the dust blows in eddies on the ground, rain may be expected.

Personal sensations act as weather predictors, to a certain extent. In certain habits of body, pain in the head, toothache, irritability of temper, pains in old sores which have healed, aching of the limbs, shooting of the corns, and excessive nervousness, are all signs of approaching wet weather. Headache, drowsiness, and general lassitude, frequently precede thunder-storms.

Domestic phenomena prognosticate the weather in various ways. The continued dampness of the balustrades betokens heavy rain; the dampness of salt in the salt-cellars affords the same indication; the cracking of furniture, and the creaking of the boards of the floor and the stairs also, foretell rain. The fire burning dull is generally a sign of wet weather, but when it burns brightly dry weather and frost may be expected.

The following *weather proverbs* of various countries, are given for the

purpose of familiarizing the various theories to the mind and assisting the memory :—

ENGLISH.

A rainbow in the morning is the shepherd's warning.
A rainbow at night is the shepherd's delight.

Evening red, and next morning gray
Are certain signs of a sunny day.

When the glow-worm lights her lamp
Then the air is always damp.

If the cock goes crowing to bed,
He'll surely rise with a watery head.

When you see the gossamer flying
Be ye sure the air is drying.

When black snails cross o'er your path,
Then a cloud much moisture hath.

When the peacock loudly bawls
Soon there'll be both rain and squalls.

When ducks are driving thro' the burn
That night the weather takes a turn.

If the moon shows like a silver shield
Be not afraid to reap your field ;
But if she rises haloed round
Soon shall we tread on deluged ground.

When rooks fly sporting high in air
It shows that windy storms are near.

A cold May and a windy
Makes a fat barn and findy.

FRENCH.

When it thunders in March, we may cry alas!

A dry year never beggars the master.

January and February do fill or empty the granary.

A dry March, a snowy February, a moist April, and a dry May, presage a good year.

To St. Valentine the spring is neighbour.

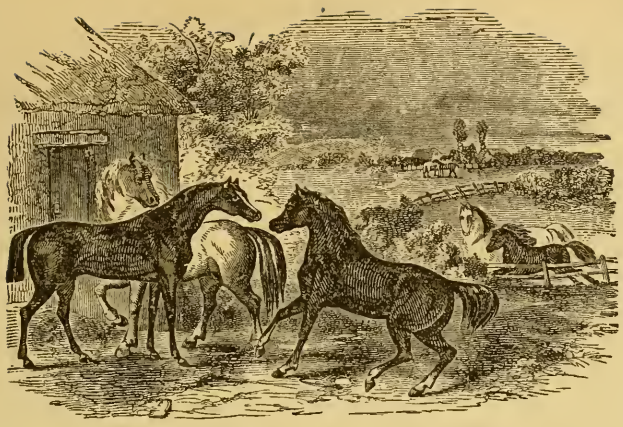
At St. Martin's, winter is in his way.

A cold January, a feverish February, a dusty March, a weeping April, a windy May, presage a good year and gay.

ITALIAN.

Dearth under water, bread under snow.

When the cock drinks in summer, it will rain a little after.



STOCK OWNERS', FARRIERS', AND LIVERY KEEPERS'.

Horses,—their Management, Diseases, Remedies, &c., &c.

The Horse.—The horse is now one of the most universally distributed animals, and everywhere he is recognized as the most useful amongst the quadruped servants of man, yielding intelligence to the dog alone, and perhaps not to him; for in those countries—some portions of Arabia, for instance—in which he is admitted to the full and unrestricted companionship of man, sharing his food with the family of his master, and, like them, a dweller in the tent, his sagacity far surpasses that of our stable-reared horses, however affectionately they may be treated.

General Management of the Horse.—There is not a more important subject than the management of the colt from the earliest period, and the preparing and fitting him for the duties he has to perform. The mare is usually at heat at some period in the spring, varying from the middle of February to the latter end of May. The age of the foal is reckoned from January; therefore it is a matter of some consequence among racing men, that the mare should foal early; for two or three month's difference in the age of the colt will materially influence the running at two years old. For mares of other classes, the months of March, April, and May, are the most favorable periods. There is, however, a strange difference in the length of the period of pregnancy in the mare, more so than in any other domesticated animal. The cause of this, or the circumstances that influence it, have never been satisfactorily explained. The writer of this sketch had two mares that were impregnated within two days of each other. One of them foaled a fortnight within the eleven months; the other did not drop her foal until four weeks after the expiration of the eleventh month. There was no possibility of a second impregnation.

The mare needs not be taken from moderate work because she is pregnant. Exercise will be of advantage to her rather than otherwise, and may be continued almost to the period of her expected parturition. She should, however, be carefully watched, that her labour-pains may not come upon her unawares. She will probably require, when half the period of pregnancy is past, a little addition made to her food. Any possible symptoms

of abortion should also be watched, for these will now, if ever, occur. They will probably be attributable to being overworked or not worked at all, or to being over-fed or half-starved. It should also be recollected that the mare which has once aborted is subject to a repetition of this accident, and that all the mares in the pasture are subject to the same mishap, from a strange species of sympathy.

A day or two after the foal is dropped, providing the weather is fine, it may be turned with its dam into a sheltered paddock, in which there is a hovel for security from the wind and rain. Hay, corn, and bran mashes must be allowed, if it is early in the season, or the grass has scarcely begun to shoot. There is nothing so detrimental to the colt as insufficient food. It should be regarded as a fundamental principle in breeding, that if the growth of the colt at any time is checked by starvation, beauty, energy, and stoutness will rarely be displayed in after-years.

In five or six months, according to the growth of the foal, the weaning may take place. The colt should be confined to a stable or other building, until he becomes a little reconciled to the loss of his dam.

The purpose for which the animal is adapted will determine the age when the process of breaking must commence. Thorough-bred ones are taken in hand in the summer after they have attained their first year. Those which are destined for other employment will not require the attention of the breaker till they are three years old. This is a process on which will materially depend the temper and value of the horse, and the pleasure of the rider. The foal should be handled and haltered, and led about by the servant who has the chief care of him, and whose conduct towards him should always be kind.

Taming of Horses.—We present a brief abstract of the various modes adopted by Rarey, in bringing about the wonderful results which have attended his efforts in this direction. Rarey's theory is founded on the following three fundamental principles. First, that the horse is so constituted by nature that he will not offer resistance to any demand made upon him which he fully comprehends, if made in a way consistent with the laws of his nature. Second, that he has no consciousness of his strength beyond his experience, and can be handled according to our will without force. Third, that we can, in compliance with the laws of his nature by which he examines all things new to him, take any object, however frightful, around, over, or on him, that does not inflict pain, without causing him to fear.

To drive a horse that is very wild and has any vicious habits.—Take up one fore-foot and bend his knee till his hoof is bottom upwards, and nearly touching the body; then slip a loop over his knee, and up until it comes above the pastern-joint, to keep it up, being careful to draw the loop together between the hoof and pastern-joint, with a second strap of some kind to prevent the loop from slipping down and coming off. This will leave the horse standing on three legs; you can now handle him as you wish, for it is utterly impossible for him to kick in this position. There is something in this operation of taking up one foot that conquers a horse quicker and more surely than anything else you can do to him—the chief reason being, that by conquering one member you conquer, to a great extent, the whole horse. When the horse's foot is first tied up, he will sometimes become very wild, and strike with his knee, and try every possible way to get it down, but he cannot do that, and will soon give up. This will conquer him better than anything you could do, and without any possible danger of hurting himself or the operator either, for you can tie up his foot and sit down and look at him till he tires. When you find that he is conquered, go to him, let down his foot, rub his leg with your hand, caress him, and let him rest a little; then put it up again. Repeat this a few times, always putting up the same foot, and he will soon learn to travel on three legs, so that you can drive him some distance. As soon as he gets a little used to this way of travelling, put on your harness, and hitch him to a sulky. You need not be fearful of his doing any damage while he has one foot up, for he cannot kick, neither

can he run fast enough to do any harm. If he wants to run, you can let him have the lines and whip too, with perfect safety, for he can go but a slow gait on three legs, and will soon be tired and willing to stop; only hold him enough to guide him in the right direction, and he will soon be tired, and willing to stop at the word. Thus you will effectually cure him at once of any further notion of running off. Generally speaking, horses kick because they are afraid of what is behind them, and when they kick against it and it hurts them, they will only kick the harder; and this will hurt them still more, and cause them to remember the circumstance much longer, and also make it still more difficult to persuade them to have any confidence in anything dragging behind them again. But by the method suggested above, horses may be harnessed to a rattling sulky, plow, wagon, or anything else in its worst shape. The horses may be frightened at first but they cannot kick or do anything to hurt themselves, and will soon find that you do not intend to hurt them, and then they will not care any more about it. You can then let down the leg and drive along gently without any further trouble. By this process, a horse, if he kick ever so badly, may be taught to go gently in harness in a few hours' time.

To make a horse lie down: bend his left fore-leg and slip a loop over it, so he cannot get it down. Then put a surcingle round his body, and fasten one end of a long strap around the other fore-leg, just above the hoof. Place the other end under the surcingle, so as to keep the strap in the right direction, take a short hold of it with your right hand, stand on the left side of the horse, grasp the bit in your left hand, pull steadily on the strap with your right, and bear against his shoulder till you cause him to move. As soon as he lifts his weight, your pulling will raise the other foot, and he will have to come on his knees. As soon as a horse recovers from his astonishment at being brought to his knees, he begins to resist, that is, he rears upon his hind legs and springs about in a manner that is truly alarming. At this juncture you must remember that your business is not to set your strength against the horse's strength, but merely to follow him about, holding the strap just tight enough to prevent him from putting out his off fore-leg. As long as you keep close to him and behind his shoulders, you are in little danger. The bridle in the left hand must be used like steering lines; by pulling to the right or left, as occasion requires, the horse, turning on his hind legs, may be guided just as a boat is steered by the rudder lines; or, pulling straight, the horse may be fatigued, by being forced to walk backwards. The strap, passing through the surcingle, keeps the trainer in his right place; he is not to pull or in any way fatigue himself more than he can help, but, standing upright, simply follow the horse about, guiding him with the bridle away from the walls when needful. To do this well requires considerable nerve, coolness, patience, and at times agility; for sometimes the animal will make a very stout fight, and even jump sideways with both fore-legs fast. When held and guided properly, few horses resist longer than ten minutes. Usually, after a violent struggle of eight minutes, the animal sinks forward on his knees, sweating profusely, with heaving flanks and quivering tail. Then is the time to get him into a comfortable position for lying down; if he still resists, he may be forced by the bit to walk backwards. Then, too, by pushing gently at his shoulders, or by pulling steadily the off-rein, you can get him to fall, in the one case, on the near side, in the other, on the off side; but the assistance rendered should be so slight that the horse must not be able to resist it. The horse will often give a final spring, when he is supposed to be quite beaten; at length, however, he slides over, and lies down, panting and exhausted, on his side. If he is full of corn, and well bred, take advantage of the moment to tie up the off fore-leg to the surcingle, as securely as the other, in a slip loop-knot. Now let the horse recover his wind, and then encourage him to make a second flight. It will often be more stubborn and fierce than the first. The object of this tying-up operation is, that he shall thoroughly ex-

haust without hurting himself, and that he shall be convinced that it is you who, by your superior strength, have conquered him, and that you are always able to conquer him. When the horse lies down for the second or third time, thoroughly beaten, the time has arrived for teaching a few more of the practical parts of horse-training. When you have done all that you desire to the subdued horse smoothed his ears if fidgety about the ears; the hind-legs, if a kicker; shown him a saddle, and allowed him to smell it, and then placed it on his back; mounted him yourself, and pulled him all over —take off all the straps. In moving round him for the purpose of gentling him, walk slowly, always from the head round the tail, and again to the head; scrape the sweat off him with a scraper; rub him down with a wisp; smooth the hair of his legs, and draw the fore one straight out. If he has fought hard, he will lie like a dead horse, and scarcely stir. You must now again go over him with a very gentle motion of the hand, and with this operation will be completed your first and most important lesson. You may now mount on the back of an unbroken colt, and teach him that you do not hurt him in that attitude; if he were standing upright, he might resist, and throw you, from fright; but as he is exhausted and powerless, he has time to find out that you mean him no harm. You can lay a saddle or harness on him, if he has previously shown aversion to them, or any part of them; his head, tail, and legs are all safe for your friendly caresses; do not spare them, and speak to him all the time. If he has hitherto resisted shoeing, now is the time for handling his fore and hind legs kindly, yet, if he attempts to resist, with a voice of authority. If he is a violent, savage, confirmed kicker, as soon as he is down, put a pair of hobbles on his hind-legs. These must be held by an assistant on whom you can depend, and passed through the rings of the surcingle; with the horse's fore-legs tied, you may usefully spend an hour in handling his legs, tapping the hoofs with your hand or a hammer—all this to be done in a firm, measured, soothing manner; only now and then, if he resist, crying, as you paralyse him with the ropes, "*Wo, ho!*" in a determined manner. It is by this continued soothing and handling that you establish confidence between the animal and yourself. Patting him as much as you deem needful, say for ten minutes or a quarter of an hour, you may encourage him to rise. Some horses will require a good deal of helping, and their fore-legs drawn out before them. It may be as well to remark, that the handling of the limbs, especially of colts, requires caution. If a horse, unstrapped, attempts to rise, you may easily stop him by taking hold of a fore-leg, and doubling it back to the strapped position. If by chance he should be too quick, do not resist, for it is an essential principle never to enter into a contest with a horse unless you are certain of being victorious. In all these operations you must be calm and not hurried. When you have to deal with a savage kicker that you wish to subdue and compel to lie down, have a leather surcingle with a ring sewed on the belly part; and when the hobbles are buckled on the hind-legs, pass the ropes through the rings, and when the horse rises again, by buckling up one fore-leg, and pulling steadily, when needful, at the hind-legs, or tying the hobble ropes to a collar, you reduce him to perfect helplessness; he finds that he cannot rear, for you pull his hind-legs, nor kick, for your pull at all three legs; and after a few attempts he gives up in despair. In practising the art of taming, an average horse may be subdued by an average horseman; but a fierce, determined, vicious horse requires a man above the average in temper, courage, and activity; activity and skill in *steering* being of more importance than strength. It is seldom necessary to lay a colt down more than twice. Perhaps the best way is to begin practising the strap movements with a donkey, or a quiet horse full of grass or water, and so go on from day to day with the same perseverance as though you were practising skating or any other art. Remember you must not be in a hurry, and you must not chatter. When you feel impatient, you had better leave off, and begin again another day. And the same with your horse: you must not tire him with one lesson, but you must give him at least

one lesson every day, and two or three if he is very nervous. The most curious circumstance of all, in connection with this strapping-up and laying-down process, is, that the moment the horse rises, he seems to have contracted a personal friendship for the operator, and with a very little encouragement will generally follow him; this feeling may as well be encouraged. by giving the animal a piece of carrot, apple, or bread. It is an excellent practice to accustom all horses to strange sounds and sights; and of very great importance to young horses which are to be ridden or driven in large towns. *To accustom a horse to a drum:* place it near him on the ground, and, without facing him, induce him to smell it again and again, until he is thoroughly accustomed to it. Then lift it up, and slowly place it on the side of his neck, where he can see it, and tap it gently with a stick or your finger. If he starts, pause, and let him carefully examine it. Then re-commence, gradually moving it backwards, until it rests on his withers, by degrees playing louder and louder, pausing always when he seems alarmed, to let him look at it and smell, if needful. In a very few minutes you may play with all your force, without his taking any notice. When this practice has been repeated a few times, the horse, however spirited, will rest his nose unmoved on the big drum while the loudest sounds are being produced. *To teach a horse to tolerate an open umbrella:* go through the same cautious forms; let him see it and smell it; open it by degrees; gain your point inch by inch, passing it always from his eyes to his neck, and from his neck to his back and tail. In half an hour any horse may be taught that no injury is intended him; and he may thus be familiarized to many other articles, such as the riding-habit, saddle-cloth, &c. *To accustom a horse to a bit.*—Use a large smooth snaffle-bit, so as not to hurt his mouth, with a bar on each side, to prevent the bit from pulling through either way. This you should attach to the head-stall of the bridle, and put it on the horse without any reins to it, and let him run loose in a large stable or shed for some time, until he becomes somewhat used to the bit, and will bear it without trying to get it out of his mouth. It would be well, if convenient, to repeat this several times before you do anything more with the animal; as soon as he will bear the bit, attach a single rein to it. You should also have a halter on the horse, or a bridle made after the fashion of a halter, with a strap to it, so that you can hold or lead him about without pulling on the bit much. He is now ready for the saddle. *To break a horse to harness.*—Place him in a light stable, take the harness and raise it very slowly until he can see it, let him smell and feel it with his nose, until he becomes familiar with it, so that you can put it on and rattle it about without his being disturbed by it. As soon as he will hear this, put on the lines, caress him as you draw them over him, and drive him about in the stable, till he will bear them over his hips. As soon as he is familiar with the harness and lines, take him out and put him by the side of a gentle horse. Always use a bridle without blinkers when you are breaking a horse to harness. Lead him to or around a light gig or phaeton; let him look at it, touch it with his nose, and stand by it till he does not care for it; then pull the shafts a little to the left, and stand your horse in front of the off-wheel. Let some one stand on the right side of the horse, and hold him by the bit, while you stand on the left side facing the vehicle. This will keep him straight. Run your left hand back and let it rest on his hip, and lay hold of the shafts with your right, bringing up very gently to the left hand, which still remains stationary. Do not let anything but your arm touch his back, and as soon as you have the shafts square over him, let the person on the opposite side take hold of one of them, and lower them very gently to the shaft-bearers. Be very slow and deliberate about hitching; the longer time you take the better, as a general thing. When you have the shafts placed, shake them slightly, so that the horse will feel them on each side. As soon as he will bear them without starting, fasten the braces, &c., and urge him along very slowly. Let one man lead the horse, to keep him gentle, while the other works gradually back with the lines till he can get behind and drive him. After you

have driven him in this way for a short distance, you can get into the vehicle, and all will go right. It is very important that the horse should proceed gently when he is first hitched. After he has been walked awhile there is not nearly so much danger of his starting. If the animal is very wild, it is better to put up one foot the first time he is driven, with the leg strapped up, the lighter the break or gig the better, and four wheels are better than two. *To make a horse follow a person.*—Turn him into a large stable or shed, where there is no chance of escape, with a halter or bridle on. Go to him and coax him a little, take hold of his halter and turn him towards you, at the same time touching him lightly over the hips with a long whip. Lead him the length of the stable, rubbing him on the neck, saying, in a steady tone of voice, as you lead him, "Come along, boy!" or use his name instead of "boy," if you choose. Every time you turn, touch him slightly with the whip, to make him step up close to you, and then caress him with your hand. He will soon learn to hurry up, to escape the whip and to be caressed, and you can make him follow you around without taking hold of the halter. If he should stop and turn from you, give him a few sharp cuts about the hind legs, and he will soon turn his head towards you, when you must always caress him. A few lessons of this kind will make him run after you, when he sees the motion of the whip; in twenty or thirty minutes he will follow you about the stable. After you have given him two or three lessons in the stable, take him out into a small field and train him; and thence you can take him into the road and make him follow you anywhere and run after you. *To make a horse stand without holding.*—After he has been well broken to follow you, place him in the centre of the stable, begin at his head to caress him, gradually working backward. If he move, give him a cut with the whip, and put him back to the same spot whence he started. If he stand, caress him as before, and continue coaxing him in this way until you get round him, without making him move. Keep walking round him, increasing your pace, and only touch him occasionally. Enlarge your circle as you walk round, and if he then moves, give him another cut with the whip, and put him back to his place. If he stands, go to him frequently and caress him, and then walk round him again. Do not keep him in one position too long at a time, but make him come to you occasionally, and follow you around the stable. Then make him stand in another place, and proceed as before. You should not train your horse more than half an hour at a time. *To cure jibbing.*—Horses contract the dangerous vice of jibbing, by improper management. When a horse jibs in harness, it is generally from some mismanagement, excitement, confusion, or from not knowing how to pull; but seldom from any unwillingness to perform all that he understands. High-spirited, free-going horses, are the most subject to jibbing, and only so because drivers do not properly understand how to manage this kind. The whipping of horses under such a condition is an error of judgment. When a horse jibs, or is a little excited, if he wants to start quickly, or looks around and does not want to go, there is something wrong, and he needs kind treatment immediately. Caress him kindly, and if he does not understand at once what you want him to do, he will not be so much excited as to jump and break things, and do everything through fear. As long as you are calm, and keep down the excitement of the horse, the chances are that you will make him understand you, which you would not do by harsh treatment. Almost any horse, after first jibbing, will start kindly if you let him stand five or ten minutes, as though there was nothing wrong, and then speak to him with a steady voice, and turn him a little to the right or left, so as to get him in motion, before he feels the stress of the weight behind him. There is a quicker process, that will generally start a jibbing horse, but it does not apply to all. Stand him a little ahead, so that his shoulders will be against the collar, and then take up one of his fore feet in your hand, and let one driver start him, and when the weight comes against his shoulders he will try to step; then let him have his foot, and he will go right along.

If you wish to cure a horse of jibbing, that has long been in that habit, a day ought to be set apart for that purpose. Put him by the side of some steady horse; have driving reins on them; tie up all the traces and straps, so that there will be nothing to excite them; do not rein them up, but let them have their heads loose. Walk them about together for some time, as slowly and leisurely as possible; stop often, and go up to the jibbing horse and coax him. Do not whip him or do anything to excite him; but keep him as quiet as possible. He will soon learn to start off at the word, and stop whenever you tell him. As soon as he goes properly, hitch him in an empty waggon, which should be standing in a favorable position for starting. It would be well to shorten the trace-chain behind the steady horse, so that, if necessary, he can take the weight of the wagon the first time you start them. Drive only a few yards at first; watch the jibbing horse closely, and if you see that he is getting excited, stop him before he stops of his own accord, caress him a little, and start again. As soon as he goes well, drive him over an ascent a few times, and then over a larger one, occasionally adding to the load. This process will cause any horse to pull truly.

Rules to be observed in the purchase of a horse.—When about to purchase a horse, examine the eyes well. The best judges are sometimes deceived in the eyes, therefore you cannot be too careful. *Clearness of the Eyes* is a sure indication of their goodness; but this is not all that should be attended to; the eyelids, eyebrows, and all the other parts, must also be considered; for many horses whose eyes appear clear and brilliant, go blind at seven or eight years old. Therefore be careful to observe whether the parts between the eyelids and the eyebrows are free from bunches, and whether the parts round the under eyelids be full, or swelled; for these are indications that the eyes will not last. When the eyes are remarkably flat, or sunk within their orbits, it is a bad sign; also when they look dead and lifeless. The *iris*, or circle that surrounds the sight of the eye, should be distinct, and of a pale, variegated cinnamon color, for this is always a sure sign of a good eye, and it adds beauty to the appearance of the animal.

Next examine the *Teeth*, as you would not wish to purchase an old horse, nor a very young one for service.

The *Feet* should next be regarded; for a horse with bad feet is like a house with a weak foundation, and will do little service. The feet should be smooth and tough, of a middle size, without wrinkles, and neither too hard and brittle, nor too soft; The *Heels* should be firm, and not spongy and rotten; the *Frogs* horny and dry; the *Soles* somewhat hollow, like the inside of a dish or bowl. Such feet will never disappoint your expectations, and such only should be chosen.

Particular regard should be had to the *Shoulders:* they should not be too much loaded, for a horse with heavy shoulders can never move well; and on the other hand, one that has very thin shoulders, and a narrow chest, though he may move briskly so long as he is sound, yet he is generally weak, and easily lamed in the shoulders; a medium should therefore be chosen.

The *Body* or *Carcass*, should neither be too small nor too large. The *Back* should be straight, or have only a moderate sinking below the withers: for when the back of a horse is low, or higher behind than before, it is both very ugly and a sign of weakness. The back should also be a proper length. The *Ribs* should be large, the *Flanks* smooth and full, and the *Hind-parts*, or, *uppermost Haunches* not higher than the shoulders. When the horse trots before you, observe if his haunches cover his fore-knees. A horse with a short hind-quarter does not look well.

The next thing to be regarded in a horse is his *Wind*, which may be easily judged of by the motion of his flanks. A broken-winded horse also pinches in his flanks, with a very slow motion, and drops them suddenly, which may be easily perceived. Many horses breathe thick that are not broken-winded, indeed, any horse will in foggy weather, or if foul fed

without sufficient exercise ; but if a horse has been in good-keeping, and had proper exercise, and yet has these symptoms, there is some defect either natural or accidental ; such as a narrow chest, or some cold that has affected the lungs.

There are other particulars that should be observed in choosing a horse. If his *Head* be large and fleshy, and his *Neck* thick and gross, he will always go heavy on the head, and therefore such should never be chosen. A horse that has his *Hocks* very wide, seldom moves well, and one that has them too near will chafe and cut his legs by crossing them. *Fleshy-legged* horses are generally subject to the Grease, and other infirmities of that kind, and therefore should not be chosen.

The *Temper* of a horse should be particularly attended to. Avoid a fearful horse, which you may know at first sight by his starting, crouching, or creeping, if you approach him.

The teeth of the horse require some lengthened consideration, not only from their admirable adaptation to this purpose, but as indicating, by the various changes which they undergo, and almost beyond the possibility of error, the age of the animal. He may, when young in years, be reduced nearly to the decrepitude of age by the barbarous usage of those who ought to have been his most zealous protectors ; the cavity above the eye may be deepened, the under-lip may fall, the limbs may be bowed, and the feet may be battered and distorted—but it is not easy to alter the character of the teeth.

The colt is generally dropped with the first and second molar and grinding-teeth having forced their way through the gum. When he is about seven or eight days old, the two central front or incisor teeth, above and below, appear. At the expiration of five or six weeks, the two next incisors may be seen. At three months they will have overtaken the central ones, and both pairs will have nearly attained their natural level. A third grinder will then have appeared ; and a little before or after the eighth month the third nipper, above and below and on each side, will have protruded. The colt will now have his full complement of front or cutting teeth.

These teeth are beautifully adapted to their purpose. They have in front an elevated cutting edge of considerable sharpness. It is formed of enamel, a polished substance which covers the tooth, and is almost too hard to be acted upon by a file This elevated edge is bent somewhat inwards and over the tooth, so that there is a depression behind it which gradually becomes stained by the food, and constitutes what is called " the mark " in the mouth of the colt or horse.

This elevated edge of enamel, hard as it is, is gradually worn down in the act of nipping and cutting the food ; and as it wears away, the hollow behind becomes diminished, and is at length totally obliterated. By the degree in which this mark is affected, the horseman, not only with regard to the first, but the permanent teeth, judges of the age of the animal. This obliteration begins to be manifest at a very early age. At six months it is sufficiently evident in the four central nippers. At a year and a half the mark will be very faint in the central nippers, diminished in the other two, and the surface of all of them will be flattened.

At twelve months a fourth grinder protrudes, and a fifth at the expiration of two years.

These are all temporary teeth. They were only designed to last during an early period of the life of the animal ; and when his jaws become considerably expanded, they give way to another set, larger, firmer, and that will probably last during life. The permanent teeth had been long growing in the socket beneath the temporary ones, and had been pressing upon their roots, and that pressure had caused an absorption of these roots, until at length they lost all hold and were displaced.

When the animal is about three years old, the central pair of nippers, above and below, are thus removed, and two fresh teeth, easily distinguish-

able from the first by their increased size, make their appearance, so that a three-year-old colt is easily recognized by these two new and enlarged central nippers.

A three-year-old colt has his form and energies much more developed than a two-year-old one, and is considerably more valuable; therefore some dishonest breeders endeavour to pass him upon the unwary as being a year older than he really is, and they accomplish this, in an ingenious but cruel manner, by punching or drawing out these teeth. This cannot, however, be effected until a portion of the second year is past, when the permanent teeth below are beginning to press upon the roots of their predecessors, and then the breeder extracts the central milk-teeth. Those below, having no longer anything to resist their progress, grow far more rapidly than they otherwise would do, and the scoundrel gains four or five months in the apparent age of his colt.

Can this trickery be detected? Not always, except by one who is well accustomed to horses. The comparatively slow wasting of the other nippers, the difference of the development of these nippers in the upper and under jaw,—for the breeder usually confines his roguery to the lower jaw, the upper one being comparatively seldom examined—these circumstances, together with a deficiency of general development in the colt, will sufficiently enable the purchaser to detect the attempted cheat.

The honest mouth of a three-year-old horse should be thus formed:—the central teeth are probably larger than the others, and have the mark on their upper surface evident and well defined. They will, however, be lower than the other teeth. The mark in the next pair of nippers will be nearly worn away, and that in the corner nippers will have begun to wear.

At three years and a half the second nippers will be pushed from their sockets, and their place gradually supplied by a new pair; and at four and a half the corner nippers will be undergoing the same process. Thus at four years old the central nippers will be fully grown: the next pair will be up, but will not have attained their full height; and the corner nippers will be small, with their mark nearly effaced. At five years old the mark will begin to be effaced from the central teeth; the next pair will be fully grown, and the blackness of the mark a little taken off; and the corner pair will be protruding or partly grown.

At this period, or between the fourth and fifth year, another change will take place in the mouth of the horse; the tushes will have begun to appear. There will be two of them in each jaw, between the nippers and the grinders, considerably nearer to the former than the latter, and particularly so in the lower jaw. The use of these tushes in the domesticated state of the horse is not evident; but they were probably designed as weapons of offence in the wild state of the animals. Attempts are too frequently made to hasten the appearance of the second and the corner teeth, in the same manner as described with regard to the first, and the gum is often deeply lanced in order to hasten the appearance of the tush.

At six years old the mark on the central nippers will be diminished, if not obliterated. A depression and a mark of rather brown hue may remain, but the deep blacked hole in the centre will no longer be found. The other incisors will also be somewhat worn, and the tush fully developed.

At seven the mark on the next pair of incisors will have nearly disappeared, and the tush will be rounded at the point and the edges.

At eight the mark will be gone from all the incisor teeth, and the tush will be evidently rounded and blunter.

At this period another piece of trickery is occasionally practised. The breeder had, until the animal was five years old, been endeavoring to give him an older appearance than his years entitled him to, because, in proportion as he approached the period when his powers were most perfectly developed, his value increased; but now he endeavours to conceal the ravages of age. The horse is cast, and with a sharp pointed steel instrument a little hole is dug on the surface of the corner incisor, to

which a red-hot iron is afterwards applied. An indelible black mark is thus left on the tooth. Sometimes the roguery is carried further; the next tooth is slightly touched with the engraver and the cautery; but here the dishonest dealer generally overreaches himself, for the form and general appearance of a six-year old horse can rarely be given to one which has passed his eighth year. The eighth year having passed, it is difficult to decide on the exact age of the horse. The incisors of the upper jaw are then the best guides. At nine years the mark will be worn away from the central teeth; at eleven, from the next pair; and at twelve from the corner ones. The tush likewise becomes shorter and blunter.

There are many circumstances which render a decision as to the age of the horse very difficult after the marks are effaced from the lower incisors, and even before that period. Horses always kept in the stable have the mark much sooner worn out than those that are at grass; and it is impossible to form any certain calculation as to crib-biters.

Cruelty to Horses.—Besides the cruel punishment inflicted upon horses, by the careless and heartless driver, he is subjected to severe punishment in the winter season, by being compelled to take frozen bits into his mouth in cold weather, tearing the skin from the tongue and the roof of his mouth, producing a heavy inflammation in the mouth and throat; he gets poor, hidebound, and the sympathetic nerves of the head take up the inflammation, carry it to the head and eyes, frequently producing blindness, and a hundred other diseases. The whip should be used as an instrument of pleasure instead of torture; and your bits should be wound with flannel or leather; so that no frozen iron will come in contact with his mouth, lips, or tongue.

Rarey's Directions for Shoeing Horses.—"There are very few blacksmiths that ever once think what a complicated piece of machinery the foot of a horse is, and by one careless blow they frequently stop the working of this machine. The majority of smiths, as soon as they pick up a horse's foot, go to work paring the heel, from the fact that it is the most convenient part of the foot, and thereby destroy the heel and braces of the foot, causing in many instances, contracted heels. The heels of a horse should be well kept up and the toe down. By lowering the heels you throw the entire weight of your horse upon the tendon of the legs, and thereby produce lameness from overtaxing a very important set of tendons. By keeping up the heel you throw the weight upon the wall of the foot. In this position you prevent stumbling, clicking, &c. Next the shoer commences to pare away the sole, thins it down until he can feel it spring with his thumb. Ask him why he does this, and he gives you no reason, except from custom; next comes the bars or braces of the foot, they are smoothed down; next in his ruinous course, comes the frogs of the feet, they are subjected to the same cutting and smoothing process. All the cutting, paring, and smoothing of the soles, bars, or frogs is a decided injury to the horse as well as to the owner. All the corns in the land are produced by this process of paring. The frogs have been placed in the foot by nature to expand the wall of the foot, and as soon as you commence to cut it, the oily substance commences to leak out, it dries up, becomes hard, losing its oily substance, makes the wall hard and dry, inducing it to crack. The nerves of the feet are very sensitive, and smiths should be very careful not to prick the foot, as it requires quite a time to relieve them. The foot is a very complicated piece of machinery, and if you keep a horse well shod and his foot in good condition, you can then generally manage the balance. The feet suffer from being kept too dry. Horses that stand on board floors should have their feet wet every day, or there should be a vat five inches deep, five feet long, and three wide, filled with water and clay, in which each horse can stand for one hour per week, unless his feet are feverish, then he should be kept in it an hour per day, or until the fever subsides. Another source of injury to horses' feet, is the habit of patronizing cheap blacksmiths. If a man can drive a nail, he then sets up a sign as a farrier

or a veterinary surgeon, when in fact he knows nothing of the anatomy of the horse's foot; not having spent any time or money in acquiring the necessary information, he can afford to shoe a few shillings cheaper than a well-informed man, but the patrons of such cheap shoeing are generally the sufferers. All horse-shoers should be well skilled veterinary surgeons, or there should be a skilful surgeon attached to every shop. Another source of poor shoeing and injury is the loss of elasticity of the frog, refusing to perform its proper functions; the heel contracts, the foot rolls, and you have a sore horse for ten or twelve months, for it requires this long to relieve a horse's suffering from being badly shod.

Under the circumstances, the first thing that touches the road or the floor of the stall, should be the frog, and the wall of the foot should be kept cut so as not to prevent it from touching at every step; and no man that owns a horse should ever allow a blacksmith to cut the soles, bars, or frogs of his horse's feet. Nature has adapted the frogs to all description of roads, climates, and weather, without being pared. So many horses have been ruined by this process of paring, that there are now several establishments in this country that manufacture India rubber pads, thinking thereby to supply the wasted frog and the elasticity of the natural foot. The frog is insensible to pressure, and you may place the whole weight of your horse on the frog and he will suffer no inconvenience, as may be seen from shoeing with one of my corn shoes; besides, this is the only reliable way to cure contracted feet; by throwing the weight upon the frog, you force them up between the walls; it acts as a wedge, and soon relieves the contracted feet. Smiths should never have their shoes hot when fitting them, as the application of hot iron extracts the oily substance from the hoof. The amount of cruel punishment inflicted on horses by cross-grained blacksmiths, is another source of poor shoeing. As soon as the horse does not stand the smith gets angry, and commences whipping and jerking the animal, which only adds terror to it, so that he soon refuses to go to the shop if he can avoid it; it is natural for horses to dislike to be shod, because the hammering shocks the nervous system, until they are accustomed to it. He should be taught to stand, and his feet well handled at home, before he is ever brought to the shop by the owner. You then save the horse pounding, and the smith an immense amount of labor that he never gets any pay for, for no man ever thinks of paying anything extra for shoeing a bad horse. The wall of the foot should never be rasped above the nail holes, and as little below the clinches as possible; all the rasping and filing but tends to thin and weaken the wall by cutting the the fibres of the foot. The nails should be countersunk into the shoe, so that there will be no chance for the clinches to rise. No horse interferes with the heel or toe; it is always the side of the foot. The habit of turning the inside of the shoe under, causes a number of horses to interfere, that would not if they were shod straight in the inside. Spread the heels as wide as possible; set the outside a little under; keep the toes full. For clicking horses, raise the heels high, cut the toes short. For speedy cuts, place your toe corks a quarter of an inch to the inside of the centre of your shoe; keep the heels wide apart. For corns, put on a shoe with a prong, for the main rim, so as to cover the entire frog, pare the wall lower than the frog, so as his entire weight will be thrown on the frog. Have the inner cork not quite so sharp as the outer one, so that if he steps upon the other foot it will not cut it; make the shoes as light as possible consistent with good service,as they are ordinarily made just about ⅓ too heavy."

Shoeing Horses.—A smith who shod for the hunt, and who said that he would have to shut up shop if a shoe was lost, as it might cause the loss of a horse worth a thousand pounds, fastened the shoe as follows:—As he drove the nails, he merely bent the points down to the hoof, without twisting them off, as the usual practice is; he then drove the nails home, and clinched them. He then twisted off the nails, and filed them lightly to smooth them, thus having, as he remarked, a clinch and a rivet to hold the nails.

When a Horse is Well Broken.—A horse is well broken when he has been taught implicit and cheerful obedience to his rider or driver, and dexterity in performance of his work. A dogged, sullen, spiritless submission may be enforced by the cruel and brutal usage to which the breaker so frequently has recourse; but that prompt and eager response to the slightest intimation of the rider's will—that manifest aim to anticipate every wish, which gives to the horse so much of his value, must be founded on habitual confidence and attachment. The education of the horse should be like that of the child. Pleasure should be as much as possible associated with the early lessons; while firmness, or, if need be, coercion must establish the habit of obedience.

It is surprising how soon, under a system of kind management, the animal which has been accustomed to go where he pleased, and to do as he thought fit, may be taught to yield up his will to another, and to obey with alacrity his master's bidding. If there is a kind-hearted and faithful servant about the premises who will undertake this task, the breeder is fortunate; for without this, he is often compelled to resign his colt to the tender mercies of a colt-breaker—a man who seldom has any conception of obtaining his object by the moral influence which kindness would give him over the youngster, but who has too frequent recourse to violence, and that of the most outrageous kind, until the colt becomes a dull, dispirited, useful but desponding and ill-treated slave through life, or, cherishing a deep feeling of wrong and a spirit of revenge, becomes determinedly vicious and dangerous.

Patience and Kindness.—Having weathered the second winter, the education of the farmer's horse may be pursued. He may be bitted. How much depends upon the application of this little coercive instrument, the bit! The first bit should always be a large one. It may be contrived so as not to hurt the mouth in the slightest degree. The colt may be permitted to champ and play with it an hour or two at a time, for a few successive days. Then portions of the harness may be put upon him; and, by-and-by, the winkers; and, a little after that, he may go as centre horse in a team of three. If he has been kindly and well managed, it is a great chance if he does not go quietly enough, and in a day or two begin to pull with the rest. Not many days need to pass before the most difficult of all the manœuvres of the cart, backing, is tried; and it will succeed oftener than they who see the horrible cruelties that are inflicted on the mouth of the horse would think to be possible. The author of this sketch is not advocating the humoring and spoiling of the horse, but he is showing how many lessons may be inculcated by patience and kindness, which brute force would fail to accomplish.

Bit for Horses.—The compound bit is composed of five principal pieces, viz.: the mouth-piece; the branches; the rings; the curb; the cross-bar. A compound bit, however, is not always requisite, many ponies and horses being ridden with a simple snaffle, which should be in the corners of the horse's mouth without pressing against it. The curb bit powerfully controls the horse, but with the snaffle he can take a natural position and act with more freedom. The snaffle is preferable for common use in every way; but if the rider cannot control his horse, he must resort to the curb bit, which should be knotted underneath the snaffle. Care should be taken that the bit does not press unnecessarily hard upon the horse's mouth, nor that it is so sharp as to wound it. It may be necessary to have a sharp bit for the headstrong and obstinate beast; yet, if it is severely and unjustifiably called into exercise, the animal will in all probability plunge and rear, and endanger both himself and his rider. The torments which the trappings of the mouth often inflict upon the docile and willing horse are useless and cruel, and instead of any benefit being derived from such a mode of treatment, it only serves to render the mouth hard, thereby destroying all the pleasure of riding, as well as causing the horse to become fretful and vicious.

To Tame Horses.—Take finely-grated horse castor, oils of rhodium and cummin; keep them in separate bottles well corked; put some of the oil of cummin on your hand, and approach the horse on the windy side. He will then move toward you. Then rub some of the cummin on his nose, give him a little of the castor on anything he likes, and get eight or ten drops oil of rhodium on his tongue. You can then get him to do anything you like. Be kind and attentive to the animal, and your control is certain.

The Feeding of Horses.—Almost of more importance than the form in which food is given, is the frequency and regularity of meals. The horse's digestive organs are not constructed for long fasts. Long intervals without food produce hunger, and hunger begets voracity; food is bolted, and indigestion and colic follow. This is doubly true and dangerous with horses doing hard work. They come to their long-deferred meal not only hungry, but exhausted; not only is the food bolted, but the stomach is in such a state as to be incapable of thoroughly active digestion, and is overpowered by half the amount of food it could otherwise digest. The prevention of waste is almost attained when we give a proper form; but there are two points to which it is right to devote some attention—the form of the mangers, and attention to the wants of the individual animals. The mangers should not be less than three feet long, eighteen inches wide, and twelve inches deep. They should have an upper border of wood projecting inwards for two inches and a transverse bar of half-inch iron across the middle. A piece of two-inch hoop iron, on the top of the manger, protects it from damage by the horse's teeth. This simple arrangement prevents the horse from throwing out his corn, and the provender is not set in so thick a layer as in the ordinary narrow and shallow manger.

Table showing the proportions of medicines to be given to horses at various ages:—

	Calomel or Tartarized Antimony.	Linseed Oil.	Aloes.
	Grains.	Ounces.	Drachms.
To foals	10	4 to 6	½ to ¾
Yearlings	15 to 20	6 8	1 1½
Two years old . . .	20 25	8 12	2 2½
Three years old . .	25 30	12 15	2½ 3½
Four years old and upwards . . .	30 60	1 2 pts.	4 6

To put Horses in Good Condition.—They need good care and clean feed. If your horse is hide-bound, and out of condition, give him a good purge of linseed oil, or castor oil—one pint. Then give bran mashes morning and evening; he will soon regain his appetite, and will be all right. At any time when your horse loses his appetite, check his food, and give a mash. Give as little medicine as possible. By this treatment you will have healthy horses.

The following are some of the Tricks that Jockeys *not unfrequently* resort to in disposing of horses.—In purchasing keep a sharp look out lest some one or more of them may be practised upon you.

How to make a Foundered and Spavined Horse Go Off Limber.—Take tincture cayenne, 1 oz.; laudanum, 2 ozs.; alcohol, 1 pt.; rub the shoulders well with warm water, then rub the above on his shoulders and backbone; give him 1 oz. of laudanum and 1 pint of gin; put it down his throat with a pint bottle; put his feet in warm water as hot as he can bear it; take a little spirits of turpentine, rub it on the bottom part of his feet with a sponge after taking them out of the water; drive him about half a mile or a mile, until he comes out as limber as a rag. If he does not surrender to his pain, tie a thin cord around the end of his tongue.

How to Make Old Horses Appear Young.—Take tincture of assafœ-

tida, 1 oz.; tinct. cantharides, 1 oz.; oil cloves, 1 oz.; oil cinnamon, 1 oz.; antimony, 2 ozs.; fenugreek, 1 oz.; fourth proof brandy, ½ gallon; let it stand ten days, then give 10 drops in gal. of water.

How to Make a Horse Appear as if Foundered.—Take a fine wire or any substitute, and fasten it around the pastern joint at night; smooth the hair down over it nicely, and by morning he will walk as stiff as if foundered.

To Make a Horse Fleshy in a Short Time.—Feed with buckwheat bran, to which add a little of the shorts; keep in a dark stable. Half a day's drive will make a horse fatted in this way poor.

How to Make a Horse Stand by his Feed and Not Eat it.—Grease the front teeth and roof of the mouth with common tallow, and he will not eat until you wash it out.

How to Make a True Pulling Horse Baulk.—Take tincture of cantharides, 1 oz., and corrosive sublimate, 1 drachm. Mix, and bathe the shoulders at night.

How to Distinguish between Distemper and Glanders.—The discharge from the nose, if glanders, will sink in water; if distemper, it will not.

How to Make a Horse Appear as if he had the Glanders.—Melt fresh butter and pour in his ears.

Physicing.—There is more injury done in the practice of this than in any other medical treatment of the horse. The old practice has been to physic and bleed every spring, and this is necessary where the horse is really sick. When you change him from the pasture to the warm stable and dry food, it is also good, the horse must be prepared for it. Give three or four mashes before the physic, and, in the majority of cases, they will be sufficient without it, especially if the bowels are slightly moved, for really the less medicine given the better.

After the physic is given, the horse should have walking exercise for an hour or two; but, when it begins to operate, he should be kept still as possible, or the medicine would be likely to gripe, and perhaps irritate the intestinal canal, and cause inflammation. You can give him a small amount of hay, and as much mash as he will eat, and as much water with the chill off as he chooses to drink; if he will not drink tepid water, give him about a quart of cold water every hour. When the purging ceases, give a mash twice a day, until you give more physic, which should be only once a week.

Barbadoes aloes is the best purgative, being always sure and safe. The dose, with the horse prepared by bran mashes, would vary from five to seven drachms, the latter sufficient for any horse. You can dissolve in warm water, and give as a drench, or make into a ball with linseed oil, and lay upon the roots of the tongue, letting go the tongue at the same time.

The next best purgative is the Croton nut; the farina or meal of the nut is used. It should be made into a ball with linseed oil. Give from a scruple to half a drachm, according to the state of the subject. It acts more speedily than aloes, but causes more debility. Linseed oil is uncertain, but safe in doses from a pound to a pound and a half. It leaves the horse in very good condition.

How to Teach a Horse to Pace.—First take nine or ten pounds of lead, divide in four parts, equal to three and three-quarter inches, by four and a half in size; make two holes in each end of these leads, then fasten two of them together and have them padded. Then fasten them on the horse's legs, one on each hind leg, just above the ankle joint. Ride your horse briskly with those weights upon his ankles, at the same time pulling each rein of the bridle alternately. By this means you immediately throw him into a pace. After you have in this way trained him to some extent, change your leaden weights to something lighter; leather paddings, or something equal to it will answer the purpose. Let him wear those weights until he is perfectly trained. By adopting this plan, you will speedily make a smooth and easy pacer of any horse.

Feeding Horses on the Road.—Many persons, in travelling, feed their horses too much, and too often, continually stuffing them, and not allowing them to rest and digest their food; of course they suffer from over-fulness, and carrying unnecessary weight. Horses should be well fed in the evening, and must not be stuffed too full in the morning, and the travelling should be moderate on starting when the horse has a full stomach. If a horse starts in good condition, he can go 20 or 25 miles without feeding. The provender required by horses while travelling or engaged in ordinary farm work, per day, may be stated thus: Hay 20 lbs., oats 3 gals., water 4 gals. Muddy water is the best for horses. Beeves require 20 lbs. of hay and 6 gallons of water per day. Quantity will vary in every case according to the size, condition, breed, &c., together with the kind of work in which they are employed.

The Check Rein on Horses.—We desire to register an earnest protest against this barbarous appendage to horses' harness. It retards the horse's progress in every position both while he is at work, and while travelling on a journey. It is both useless and cruel in every sense of the word, without any compensating qualities to recommend it. Mr. Angell, of the "Boston Society for the Prevention of Cruelty to Animals," who has travelled over a great part of Europe in the interests of humanity to our dumb servants, says, that the use of the check rein is confined to America alone, being deservedly discarded everywhere both in England and on the Continent. The reason why it is so discarded, was very graphically explained by an extensive horse owner in Glasgow, as he remarked, in conversation with Mr. Angell, that "We canna get the wark oot o' the horse wi' the check rein." To check rein a horse, is equivalent to trussing a man's head backward, towards his back or heels, and compelling him, while bound in this position, to do duty with a loaded wheelbarrow.

To Prevent Horses from Jumping.—Pass a good stout surcingle around his body; put on his halter, and have the halter strap long enough to go from his head, between his fore legs, then through the surcingle, and back to one of his hind legs. Procure a thill strap, and buckle around the leg between the foot and joint, fasten the halter strap in this—shorter or longer, as the obstinacy of the case may require. It is also useful to keep colts from running where there is likely to be danger from the result; if the thill strap should cause any soreness on the leg, it may be wound with a woollen cloth, and it would be well to change it from one leg to another occasionally.

To Cure Balky Horses.—One method to cure a balky horse is to take him from the carriage, whirl him rapidly around till he is giddy. It requires two men to accomplish this,—one at the horse's tail. Don't let him step out. Hold him to the smallest possible circle. One dose will often cure him, 2 doses are final with the worst horse that ever refused to stir. Another plan is to fill his mouth with the dirt or gravel from the road, and he will at once go, the philosophy of this being that it gives him something else to think about.

Halter Pulling.—A new way to prevent horses pulling at the halter, is to put a very small rope under the horse's tail bringing the ends forward, crossing them on the back, and tying them on the breast. Put the halter strap through the ring, and tie the rope in front of the horse. When the horse pulls, he will, of course, find himself in rather an uncomfortable position, and discontinue the effort to free himself.

To Prevent Horses Kicking in the Stall.—Fasten a short trace-chain about 2 feet long, by a strap to each hind foot. A better way is to have the stalls made wide enough so that the horse can turn in them easily. Close them with a door or bars, and turn the animal loose. After a while he will forget the habit, and stand tied without further trouble.

Crib-biting.—This familiar habit in horses is nothing more than a symptom of dyspepsia. It is that form of indigestion which in man is accompanied with acid eructations. Crib-biting is simply belching. Give one ounce of powdered charcoal twice a day in a bran mash.

Mexican Mustang Liniment.—Petroleum, olive oil, and carbonate of ammonia, each equal parts, and mix.

Merchant's Gargling Oil.—Take 2½ gals. linseed oil; 2½ gals. spirits turpentine; 1 gal. western petroleum; 8 oz. liquor potass.; sap green, 1 oz.; mix all together, and it is ready for use.

Scratches.—Cut off the hair close, and wash the legs in strong soap-suds or urine, or wash with warm vinegar saturated with salt, and afterwards dress over with a small quantity of hog's lard.

Condition Powders.—1 pound ginger; 1 ounce anise seed, pulverized; one ounce fenugreek seed; two ounces ginseng root, pulverized.; one ounce seed of sumac berries pulverized; one ounce antimony. Mix it with a pound of brown sugar. Excellent for coughs, colds, or to give a horse an appetite.

Arabian Condition Powders.—Ground ginger, 1 lb.; sulphuret of antimony, 1 lb.; powdered sulphur, 1 lb.; saltpetre, 1 lb. Mix all together, and administer in a mash, in such quantities as may be required. The best condition powder in existence.

Cough Powders.—Camphor, one ounce; tartar emetic, one ounce; nitrate potassa, two ounces, and digitalis, one drachm, if you choose.

Blistering Liniment.—1 part Spanish flies, finely powdered; 3 of lard; and 1 of yellow resin. Mix the lard and resin together, and add the flies when the other ingredients begin to cool. To render it more active, add 1 pint spirits turpentine.

Sloan's Horse Ointment.—4 oz. resin; 4 oz. bees-wax; lard, 8 oz.; honey, 2 oz. Mix slowly and gently, bring to a boil; then add less than 1 pint spirits turpentine; then remove and stir till cool. Unsurpassed for horse flesh, cracked hoofs, human flesh, &c.

Horse Ail.—Make a slow fire of old shoes, rags, herbs, &c. When fired a little, smother so as to make a great smoke and steam, then set a barrel without heads, over the fire, and hold the horse's head down in the barrel, and smoke him well. This will soon produce a copious running at the nose, and he will be so well pleased that he will voluntarily hold his head in the smoke. Continue this half an hour or more daily, meanwhile give him potatoes and warm bran mashes, and gently physic if there be much costiveness which the laxative food will not remove. If he has fever, treat him for it.

For Restoring Hair to Galled Spots on Horses.—Take one pound red clover blossoms and six quarts of water, simmer to a thick syrup—then add sufficient barbary tallow to make a paste. This form is the best ointment for this purpose extant.

Grease Heel.—Lye made from wood-ashes, and boil white-oak bark in it till it is quite strong, both in lye and bark-ooze; when it is cold, it is fit for use. Wash off the horse's legs with Castile soap; when dry, apply the above lye with a swab fastened on a long stick to keep out of his reach, as the smart caused by the application might make him let fly without much warning; but is a sure cure, only it brings off the hair. To restore the hair after the cure is effected, make and apply a salve by stewing elder bark in old bacon; then form the salve by adding a little resin, according to the amount of oil when stewed, or ½ lb. resin to each pound of oil.

Medicated Food for Horses and Cattle.—Take linseed cake and pulverize or grind it up in the shape of meal, and to every 50 lbs. of this ingredient, add 10 lbs. Indian meal; 2 lbs. sulphuret of antimony; 2 lbs. ground ginger, 1 ¾ lbs. of saltpetre, and 2 lbs. powdered sulphur. Mix the whole thoroughly together, put in neat boxes or packages for sale or otherwise as desired, and you will have an article equal in value to "Thorley's Food," or almost any other preparation that can be got up for the purpose of fattening stock or curing disease in every case when food or medicine can be of any use whatever. This article can be fed in any desired quantity, beginning with a few tablespoonfuls at a time, for a horse, mixing it with his grain, and in the same proportion to smaller animals, repeating the dose and increasing the quantity as the case may seem to require.

Poll Evil and Fistula.—Common potash dissolved in ½ pint of water, 1 lb.; add ½ oz. belladonna extract, and 1 oz. gum arabic dissolved in a little water; work all into a paste with wheat flour, and bottle up tight. Directions: wash the sores well with Castile soap-suds; then apply tallow all around them. Next, press the above paste to the bottom of all the orifices; repeat every two days till the callous fibrous base around the poll evil or fistula is completely destroyed; put a piece of oil-cloth over the sores, and afterwards heal up with Sloan's Horse Ointment.

Cure for Bots in Horses.—Give the horse, first, 2 quarts of new milk, and 1 quart molasses; 15 minutes afterwards, give 2 quarts very strong sage tea; 30 minutes after the tea, give 3 pints (or enough to operate as physic), of curriers' oil. The molasses and milk cause the bots to let go their hold, the tea puckers them up, and the oil carries them completely away. Cure, certain, in the worst cases.

To Distinguish and Cure Distemper.—Wet up bran with rather strong lye; if not too strong, the horse will eat it greedily. If they have the distemper, a free discharge from the nostrils, and a consequent cure, will be the result, if continued a few days; but if only a cold, with swellings of the glands, no change will be discovered.

Remedy for Founder.—Draw about 1 gal. blood from the neck; then drench the horse with linseed oil, 1 qt.; now rub the fore-legs long and well with water as hot as can be borne without scalding.

For Strains and Swellings.—Strong vinegar saturated with common salt, used warm, is good for strains and reducing swellings. 1 oz. of white vitriol; 1 oz. of green copperas; 2 teaspoonfuls of gunpowder, all pulverized together, and dissolved in 1 quart of soft water, and used cold, rubbing in thoroughly, is one of the best applications known for reducing swellings.

Cure for Staggers.—Give a mess twice a week, composed of bran, 1 gal.; sulphur, 1 tablespoonful; saltpetre, 1 spoonful; boiling sassafras tea, 1 quart; assafœtida, 1 ⅛ oz. Keep the horse from cold water for half a day afterwards.

Split or Broken Hoof.—Let the blacksmith bore two holes on each side of the crack or split; pass long nails through the holes and clinch tight. After anointing with the hoof-bound liquid, it will soon grow together.

Hoof-Bound Wash.—Spirits turpentine, 4 oz.; tar, 4 oz.; whale oil, 8 oz. Mix, and apply to the hoofs often.

To Toughen Hoofs.—Wash them frequently in strong brine, and turn brine upon the bottoms, and soak a few minutes each time.

Liniment for Fifty Cents per Gallon.—Best vinegar, 2 qts.; pulverized saltpetre, ½ lb.; mix, and set in a cool place till dissolved. Invaluable for old swellings, sprains, bruises, &c.

Sore Breasts.—This generally occurs in the spring, at the commencement of plowing. At times the fault is in having poor old collars, and not having the collar well fitted to the horse's breast; and often, the hames are either too tight or too loose. There is a great difference in horses about getting chafed or galled, and at times it has seemed to be impossible to keep their breasts from getting sore; but a thorough application of strong alum water or white oak bark to the breasts of the animal, 3 days before going to work, toughen them so that they will not get sore. Another excellent plan is, when you let your team rest for a few moments during work, to raise the collar and pull it a little forward, and rub the breast thoroughly with you naked hand.

Itch.—To cure a horse affected with itch, first reduce his daily allowance of food, putting him on low diet and then give him a teaspoonful of a mixture of equal parts of sulphur and antimony, and at the end of a week or 10 days the sores will have disappeared and the horse will be covered with a fine coat of new hair.

To Cure Broken Legs.—Instead of summarily shooting the horse, in the greater number of fractures it is only necessary to partially sling the horse by means of a broad piece of sail, or other strong cloth placed under

the animal's belly, furnished with 2 breechings and 2 breast girths, and by means of ropes and pulleys attached to a cross beam above, he is elevated, or lowered, as may be required. By the adoption of this plan every facility is allowed for the satisfactory treatment of fractures.

Physic-Ball for Horses.—Barbadoes aloes, from 4 to 5 or 6 drachms (according to size and strength of the horse); tartrate of potassa, 1 drachm; ginger and Castile soap, each 2 drachms; oil of anise, or peppermint, 20 drops; pulverize and make all into one ball, with thick gum solution. Feed by giving scalded bran instead of oats, for two days before giving the physic, and during its operation.

Weak Ankles in Colt.—If the ankles are very weak, and incline to bend back so as to bring the fetlock close to the ground, you will have to rive out some ash or oak splints; pack the uneven parts with cotton batting; starch a long cotton bandage, (8 to 12 feet long), and evenly apply the splints, and then evenly wind the bandage. Remove every third day until no longer needed. If an ordinary weakness, the oak bark astringent lotion, already twice recommended, will be all you will require.

Big Leg.—To cure, use the "Blistering Liniment" with regularity every third hour until it blisters. In 3 days wash the leg with linseed oil. In 6 days wash it clean with soap and water. Repeat every 6 days until the swelling goes down. If there should be any callous left, apply spavin ointment.

Liniment for Sweeny.—Alcohol and spirits turpentine, of each 8 oz.; camphor-gum, pulverized cantharides, and capsicum, of each 1 oz.; oil of spike, 3 oz.; mix. Bathe this liniment in with a hot iron, and a cure is sure to follow.

Swelling on Neck of Horse.—Paint constantly with a small brush dipped in strong tincture of iodine. Should this fail after a few weeks trial, apply instead, biniodide ointment. Keep from being chafed or irritated, or it will terminate in fistula most surely.

Lampas.—This consists in a swelling of the first bar of the upper palate. It is cured by rubbing the swelling 2 or 3 times a day with ½ oz. of alum and the same quantity of double refined sugar mixed with a little honey.

Gravel.—Steep ½ lb. of hops in a quart of water and give it as hot as the horse can stand it.

For Spavin.—Take sweet oil, 4 oz.; spirits turpentine, 2 oz.; oil of stone, 1 oz. Mix, and apply three times per day. If the horse is over four years old, or in any case when this is not sufficient, in addition to it, you will fit a bar of lead just above it, wiring the ends together, so it constantly wears upon the enlargement; and the two together will cure nine cases out of every ten, in six weeks.

Cure for Bone Spavins, $300 Recipe.—Corrosive sublimate, quicksilver, and iodine, of each 1 oz. Rub the quicksilver and iodine together; then add the sublimate, and lastly the lard, rubbing them thoroughly. Shave off the hair the size of the bone enlargement; grease all around it, but not where the hair is shaved off, this prevents the action of the medicine, except on the spavin. Then rub in as much of the paste as will lie on a 3-cent piece, each morning, for 3 or 4 mornings. In from 7 to 8 days, the whole spavin will come out; then wash the wound with suds for an hour or so, to remove the poisonous effects of the paste; afterwards heal up the sore with any good healing salve, or Sloan's Horse Ointment, as per recipe above, keeping the sore covered while it is healing up.

Another very Valuable Recipe for Ring-bone.—Pulverized cantharides, oils of spike, origanum, amber, cedar, Barbadoes tar, and British oil, of each 2 oz.; oil of wormwood, 1 oz.; spirits turpentine, 4 oz.; common potash, ½ oz.; nitric acid, 6 oz.; sulphuric acid, 4 oz.; lard, 3 lbs. Melt the lard, and slowly add the acids; stir well, and add the other articles, stirring till cold; clip off the hair, and apply by rubbing and heating in. In about 3 days, or when it is done running, wash off with soap-suds, and apply again. In old cases, it may take 3 or 4 weeks; but, in recent cases, 2 or 3 applications have cured.

ANOTHER.—Pulverized cantharides, oils of origanum and amber, and spirits turpentine, of each 1 oz.; olive oil, ½ oz.; sulphuric acid, 3 drams: put all, except the acid, into alcohol; stir the mixture, add the acid slowly, and continue to stir till the mixture ceases to smoke; then bottle for use. Apply to ring-bone or spavin with a sponge tied on the end of a stick, as long as it is absorbed into the parts; twenty-four hours after, grease well with lard; and in twenty-four hours more, wash off well with soap-suds. One application is generally sufficient for spavins, but may need two; ring-bones, always two or three applications, three or four days apart, which prevents loss of hair. This will stop all lameness, but does not remove the lump.

SPLINT AND SPAVIN LINIMENT.—Oil of origanum, 6 oz.; gum camphor, 2 oz.; mercurial ointment, 2 oz.; iodine ointment, 1 oz.; melt by putting all into a wide-mouthed bottle, and setting it in a kettle of hot water. Apply it to bone spavins or splints, twice daily, for four or five days, and a cure is guaranteed.

SPAVIN AND RINGBONE.—Cantharides, four ounces; origanum, two ounces; sulphate of zing, one ounce; Venice turpentine, three ounces; muriat. tinct. iron, two ounces; verdigris, three ounces; oil vitriol, two ounces; fresh lard, one pound. Shave the hair from the part diseased, and rub the parts with the medicine. You must use your own judgment in using this medicine; that is in the length of time necessary to remove the callus. It must be used every other day; this will dissolve the ossified substance, and ooze it out. When you see the lump is diminished enough, then use the same astringent as I have directed in the other cure, that is, white oak bark and alum; a quarter pound to a half gallon of bark juice, boiled down to a strong decoction. Use morning and evening.

SPAVIN AND RINGBONE RECEIPT.—The first-named disease comes at the lower part of the gambrel joint. It is caused by a strain or bruise—either will cause it; this opens the pores, and causes the substance to concentrate at one place, and forms in a gristly or bony substance, and causes the joint to become stiff and sore. The horse sometimes becomes lame before enlargement is perceivable. In some cases it will continue to grow for two years; it will then become a hard bone. The enlargement at this stage, cannot be removed—you may kill the disease, and kill the lameness. The great object with this disease is stop the leakage. There has nothing been used as an astringent; when by removing the lump, without the astringent, it leaves the parts loose and open, but if used, it closes and stops the pores; then, by letting the horse stand until it heaves, becomes firm.

CURE.—Four ounces green euphorbium, fine; one ounce Spanish flies, pulverized; four ounces corrosive sublimate; four ounces red precipitate; six ounces white pine turpentine; four ounces iodine; six ounces lard; melt the lard and turpentine together; after it is nearly cold, add the other articles, and stir until it is cold; it is then ready for use.

Then rub the enlargement until it is warm; then rub on the ointment, and let it remain for twenty-four hours; then take lard, and rub upon it until all of the ointment is taken out. Let it remain one day, then apply the medicine again; keep this up until the enlargement is gone; then use oak bark as an astringent to bathe it in, and bandage until well, keeping it well saturated with the oak bark water.

You may use the same ointment for "thorough-pin;" after it is blistered sufficiently deep, use the oak bark and bandage until healed. The same for blood spavin and wind puffs. It will be necessary to use a pad under the bandage in "thorough-pin," to make it bear evenly.

Keep the horse quiet, while using these medicines and on a low diet.

SADDLE AND HARNESS GALLS, &C.—White lead and linseed oil, mixed as for paint, is unrivalled for healing saddle, harness, or collar galls and bruises. Try it, applying with a brush. It soon forms an air-tight coating and soothes the pain, powerfully assisting nature.

MAGIC LINIMENT.—Two ounces oil spike; two ounces, origanum; two

ounces of hemlock; two ounces of wormwood; four ounces of sweet oil; two ounces spirits ammonia; two ounces of gum camphor; two ounces spirits of turpentine, and one quart of proof spirits; nine per cent. Mix well together and bottle tight. For sprains, bruises, lameness, etc., this liniment is unsurpassed and originally cost, (what it is really worth) one hundred dollars. This is the same liniment without the turpentine, which has achieved such wonderful cures for human ailments. For domestic purposes it is invaluable.

Cough.—Quit feeding musty hay, and feed roots and laxative food. Sprinkle human urine on his fodder, or cut up cedar boughs and mix with his grain; or boil a small quantity of flax-seed, and mix it in a mash of scalded bran, adding a few ounces of sugar, molasses, or honey. Administer lukewarm. If there should be any appearance of *heaves*, put a spoonful of ground ginger once per day in his provender, and allow him to drink freely of lime water.

Rarey's Liniment.—Sulphuric ether, 4 ozs.; hartshorn, 4 ozs.; oil of origanum, 4 ozs.; alcohol, 4 ozs.; sweet oil, 4 ozs. Shake well before using. For sprains on horses, &c., apply by rubbing and cover with a tight flannel bandage. For headache, rub a little on the temples and apply a bandage wet with the liniment to the forehead.

Rarey's Wizard Oil.—Oil of origanum, 6 ozs.; alcohol, 6 ozs.; spirits turpentine, 1 oz.; camphor, 1 oz. Shake well before using.

Dr. Cole's King of Oils.—1 oz. green copperas; 2 oz. white vitriol; 2 oz. common salt; 2 oz. linseed oil; 8 oz. molasses. Boil over a slow fire fifteen minutes in a pint of urine; when almost cold, add 1 oz. of oil of vitriol and 4 oz. of spirits of turpentine. Apply to wounds with a feather. A very powerful liniment.

Simple Liniment.—Put into spirits of turpentine, all the camphor gum it will cut, when for ordinary purposes it is fit for use; but if designed to reduce pain, add as much laudanum as there is turpentine. This liniment is as good as it is simple.

English Stable Liniment, very strong.—Oil of spike, aqua-ammonia, and oil of turpentine, each 2 oz.; sweet oil, and oil of amber, each, 1½ oz.; oil of origanum, 1 oz. Mix.

Founder cured in 24 Hours.—Boil or steam stout oat-straw for half an hour, then wrap it around the horse's leg quite hot, cover up with wet woollen rags to keep in the steam; in six hours renew the application, take 1 gal. of blood from the neck vein, and give 1 quart linseed oil. He may be worked next day.

Liniment for Open Wounds.—Sulphate of copper (copperas) one ounce; white vitriol two ounces; mixture of soda (salt) two ounces; oil linseed, two ounces; Orleans molasses, eight ounces; boil over a slow fire fifteen minutes, in a pint of wine, all of the above ingredients. When nearly cold, add one ounce of oil vitriol and four ounces spirits turpentine, and bottle for use. Apply it to the wound with a quill, which will soon set the wound to discharging, and perform a cure in a few days. Be careful to keep the wound covered, either by bandage or a plaster. Should be applied once or twice a day, until it discharges freely.

Colic Cure for Horses and Persons.—Spirits turpentine, 3 oz.; laudanum, 1 oz.; mix; and for a horse give all for a dose, by putting it into a bottle with half a pint of warm water. If relief is not obtained in an hour, repeat the dose, adding half an ounce of the best powdered aloes, well dissolved. Cure, certain.

For Persons, a dose would be from 1 to 2 teaspoonfuls in warm tea; children or weak persons, less.

Colic Cure.—Bleed freely at the horse's mouth; then take ½ lb. raw cotton, wrap it around a coal of fire, so as to exclude the air; when it begins to smoke, hold it under his nose till he becomes easy.

To Cure Distemper.—Take 1¼ gals. of blood from the neck vein; then administer sassafras oil, 1½ oz. Cure, speedy and certain.

Hide Bound.—This is not so much a shrinking of the fatty substance between the skin and the muscles, as it is an alteration of the skin itself. It is a drying up of the oily moisture of the skin; it thus becomes dry and hard, the scales to the cuticle no longer yield to the skin, but separating in every direction, turn the hair and gives it a staring rough look, which is an indication that the horse is out of condition. The vessels of the skin and bowels, as well as the stomach, are deranged. It is a symptom of disease of the digestive organs.

At first, give a bran mash, and, if it can be had, sassafras tea. But in severe cases use levigated antimony two drachms, nitre three drachms, sulphur five drachms—give every night in a mash. The antimony acts on the skin, the sulphur on the bowels, and the nitre on the urinary organs. Rub him and give him warm clothing. The skin will soon become loose, and the horse be in condition again.

For Looseness or Scouring in Horses or Cattle.—Tormentil root, powdered. Dose for a horse or cow, 1 to 1½ oz. It may be stirred in 1 pint of milk, and given; or it may be steeped in 1½ pints of milk, then given from three to six times daily, until cured.

Scours and Pin-Worms in Horses and Cattle.—White ash bark burnt into ashes, and made into a rather strong lye; then mix ½ pint of it with 1 pint warm water, and give all two or three times daily. This will certainly carry off the worms, which are the cause, in most instances, of scours and looseness.

Quarter Crack.—For this, pare with a sharp knife from the hair down, taking away the whole back part of the hoof down to the quick; then pare the other down thin; then set your shoe only so far as the hoof runs. By this means the shoe cannot spring down upon the heel. The hoof will then grow down firm and sound.

Cure for Heaves.—Take smart weed, steep it in boiling water till the strength is all out; give one quart every day mixed with bran or shorts, for eight or ten days. Give green or cut up feed, wet with water during the operation, and it will cure.

Valuable Remedy for Heaves.—Calcined magnesia, balsam of fir, balsam copaiba, of each 1 oz.; spirits turpentine, 2 oz.; put them all into 1 pint best cider vinegar; give for a dose, 1 tablespoonful in his feed, once a day for a week; then every other day for 2 or 3 months. Wet his hay with brine, and also his other feed. He will cough more at first, but looser and looser till cured.

Best Remedy for Heaves.—Balsam of fir and balsam of copaiba, 4 oz. each, and mix with calcined magnesia sufficiently thick to make it into balls; and give a middling-sized ball night and morning for a week or ten days.

Heaves.—Reasons why it is not in the Lungs.—*First.* If the disease was in the lungs, it would create inflammation, and have the same effect as inflammation of the lungs by cold. The horse would be weak and drooping, without appetite, and really could not be driven two miles as any person would naturally drive a horse. But a heavy horse can be driven from eight to twelve miles within an hour. This is positive proof that it is not in the lungs.

Second.—Take a heavy horse and turn him out to pasture forty-eight hours, and he will breathe clear and easy, showing no signs of the heaves. The grass has not reached the lungs, still it has stopped the hard breathing; but if you will give the horse cold water to drink, he will cough. Has the water touched the lungs? No; but it has touched the disease. This is another reason why it is not in the lungs.

I will tell you where the disease is, and what it is caused by. *First.*—A dainty horse is not liable to heaves, but a hearty eater is liable to this disease—not from the amount of food that he eats, but from the hoggish way of eating. There are two pipes leading to the stomach and lungs; where they meet there is a throttle-valve. A horse on eating coarse food,

scratches his throttle; then, by a hard drive, and warming the horse, he takes cold in his wound, and it becomes a running sore or canker. By turning the horse to grass, the juice cleanses and washes the wound; the grass being cool takes the inflammation from the disease; the swelling is gone, and the horse breathes free and easy as ever. This is positive proof that it is not in the lungs. Then, by feeding with coarse and dry hay, it irritates and creates inflammation and causes the horse to breathe hard again.

Cure.—Take Balsam of Fir and Balsam of Copaiva, equal parts; add enough calcined magnesia to make into balls. Give a middle-sized ball, night and morning, for ten days or two weeks—a ball about the size of the yolk of an egg. This a sure cure. I never made a failure in any case. You should be careful about feeding for two weeks, after giving the medicine. Cut feed, and wet the hay. A little brown sugar in his food for a few days would be good.

Glanders.—In purchasing a horse, be very careful to ascertain that he is unaffected with this truly terrible disease, for which there is no cure, and which has, in so many frightful instances, proved its communicability to man and other animals. Notwithstanding the awful nature of this disease, however, not a whit less dreadful than hydrophobia—dealers at fairs and other places will frequently endeavor to pass off a glandered horse upon an unwary customer. The usual trick is, stimulating the nostrils till the horse has snorted away all the matter lying in them, and then, by injections of an astringent nature, producing a temporary suppression of the discharge. Others cram a pledget of tow up the nostrils. These tricks may be deetcted by the animal's uneasiness, tossing of his head, efforts to sneeze, the red and vascular appearance of the interior of the nostril, but especially by the fetid breath.

Accidents.—There are also some accidents that the proprietor of a horse may with safety look after himself. For instance broken knees. When a horse falls and lacerates his knees, your first object should be, by careful washing, to remove all foreign substances from the wound. In the next place, ascertain whether the joint cavity has been penetrated. Do not use a probe for this purpose; but apply a poultice of linseed-meal, and when, in about eight or ten hours afterwards, you take it off, you will see a yellowish, glairy fluid, effused upon it, if the joint have been penetrated. Should this have been the case, send at once for the veterinary surgeon. When the joint has not been penetrated, get the lips of the wound together, and keep them so by a compress and bandages, which need not be renewed till the third day. The earlier the wound is closed the less mark will be left on the part.

Flora.

HOUSEHOLD AND CULINARY.

Baking, Cooking, Preserving, Pickling, etc., Bread, Biscuit, Meats, Soups, Vegetables, Puddings, Sauces, etc.

Chickens.—Chickens for roasting or boiling should have a dressing prepared like that for turkeys. Half a teacup of rice boiled with the chickens makes them look white. They will be less liable to break if the water is cold when they are put in. A little salt pork boiled with the chickens, improves them. If you do not boil pork with them they will need salt. Chickens for broiling should be split, the inwards taken out, and the chicken washed inside and out. Put the bony side down on the gridiron, and broil it very slowly until brown, then turn it, and brown it on the other side. About forty minutes is required to broil a common sized chicken. For roast chicken, boil the liver and gizzards by themselves, and use the water for gravy to the chickens—cut the inwards in slices, and put them in the gravy.

Chickens Boiled.—Care should be taken to select the chickens plump, or they form a meagre dish; they should receive much attention in the boiling; they require less time than a fowl, and are sent to table with white sauce, and garnished with tufts of white broccoli.

Chicken Braised.—Bone and stuff chickens with forcemeat. Lay the bones and any other poultry trimmings into a stew-pan, and the chickens on them. Put to them a few onions, a bunch of herbs, three blades of mace, a pint of stock, and a glass or two of sherry. Cover the chickens with slices of bacon, and then white paper; cover the whole close, and put them over a slow fire for two hours. Then take them up, strain the braise, and skim off the fat carefully; set it on to boil very quick to a glaze, and brush the chickens over with it. Serve with gravy and catsup.

Chickens Pulled.—Remove the skin carefully from a cold chicken, then pull the flesh from the bones; preserving it as whole as you can. Flour them well and fry them a nice brown in fresh butter; draw them, and stew in a good gravy well-seasoned; thicken a short time before serving with flour and butter, and add the juice of half-a-lemon.

Chicken Cutlets.—Skin and cut into joints one or two young chickens, and remove the bones with care from the breast, merry-thoughts, and thighs, which are to be separated from the legs. Mix well together a teaspoonful of salt, nearly a fourth as much of mace, a little grated nutmeg, and some

cayenne ; flatten and form into good shape the boned joints of chicken, and the flesh of the wings ; rub a little of the seasoning over them in every part, dip them into beaten egg, and then into very fine bread-crumbs, and fry them gently in fresh butter until they are of a delicate brown. Some of the bones and trimmings may be boiled down in half a pint of water, with a roll of lemon-peel, and a little salt and pepper to make gravy, which, after being strained and cleared from fat, may be poured hot to some thickening made in the pan with a slice of fresh butter and a dessertspoonful of flour. Pile the cutlets high in the centre of the dish, and serve the sauce under them, or separately, in a tureen.

Chicken Fricassee.—Take 2 large young chickens, cut in small pieces, put in cold water for 1 hour to take all the blood out, then put in saucepan to parboil for half an hour, then take from saucepan drained well, have ready 1 qt. good fresh cream, 2 oz. good butter, 1 oz. of flour, all well mixed together ; put in saucepan with the chickens ; put on the fire to boil tender ; season with pepper and salt ; serve with toasted bread in the bottom of the dish.

Chicken Fricassee.—Parboil chickens in a small quantity of water ; let them cool ; cut them up, and simmer them in a little gravy made from the liquor they were boiled in, together with a piece of veal or mutton, with onion, mace and lemon-peel, some white pepper, and a bunch of sweet herbs. When quite tender, keep them hot while the sauce is being thickened in the following manner:—strain it off, and put it back into the saucepan with a little salt, nutmeg, flour, and butter ; give it one boil, and just before serving beat up the yolk of an egg in half a pint of cream, and stir them over the fire without allowing them to boil.

Chicken Roasted.—Draw and truss the chicken, and cover the breast with a slice of fat bacon ; baste it first with butter, and afterwards with its own gravy. Cover the breast with a sheet of buttered paper ; which must be removed about ten minutes before the chicken is done, that it may become of a good brown color. A large chicken will require half an hour to roast, a small one twenty minutes.

Chicken Salad.—Cut into fillets the meat of cold roast chicken ; dispose them symmetrically, with a lettuce cut, at the bottom of a salad-bowl ; arrange other lettuces cut, with fillets of anchovies ; cover the whole with sauce made of oil, vinegar, mustard, and the yolks of hard-boiled eggs, rubbed smooth.

Chicken Broiled.—Boil a chicken gently for five or ten minutes, leave it to become cold, then divide it, and dip it into egg and well-seasoned bread-crumbs, plentifully sprinkled with clarified butter ; dip again into the crumbs, and broil over a clear and gentle fire from half to three-quarters of an hour. It should be served very hot, with mushroom-sauce or with good plain gravy thickened and flavored. It should be opened at the back and evenly divided quite through : the legs trussed ; the breast-bone removed, and both sides of the bird made as flat as possible, that the fire may penetrate every part equally ; the inside being first laid towards it. The neck, feet, and gizzard may be boiled down with a small quantity of onion and carrot, previously browned in a morsel of butter to make the gravy ; and the liver, after having been simmered with them for five or six minutes, may be used to thicken it after it is strained. A teaspoonful of lemon-juice, some cayenne pepper, and minced parsley, should be added to it, and a little arrowroot, or flour and butter.

Chickens Stewed.—Take two pair of good, young, fat chickens ; have them well dressed ; cut them in pieces through each joint, as the breaking of the bones spoils them, it leaves small pieces of the bone all through them ; put them in cold water, and wash them well ; then put them in a saucepan with as much water as will cover them ; set them on a good fire to boil, have one pound of good clear salt pork cut in strips about ¼ of an inch square ; put all in the same pan together, and boil till well done ; have some flour and good fresh butter, well rubbed together, put in saucepan to

boil for five minutes; season with pepper and salt to suit you. May add a little fine cut parsley if you like; serve hot, with stewed or baked potatoes.

TURKEY ROASTED.—When trussed for roasting, cut the liver to pieces, and set it over the fire in a stewpan, with half a pint of oysters washed, and their liquor, which must be strained, some pepper and salt, two bay leaves, two blades of mace, a piece of butter rolled in flour; let these stew very gently about ten minutes, and then take them off, singe the turkey, and stuff it with the oysters, cover the paper over it, spit it and lay it down to a good fire, but at a distance; while it is roasting, set on a stewpan, with half a pint of essence of ham; take a pint of oysters, throw them into boiling water, remove the beard, then put them into the essence of ham; add a little lemon-juice, give them a boil.

TURKEY ROASTED No. 2.—It is stuffed with either sausage meat or fillet of veal stuffing. While roasting, a piece of paper should be placed over the part stuffed, as, being bulky, it will catch the fire and become scorched, but keep the heat well to the breast, in order that it may be as well done as the rest of the bird. Baste well, and froth it up. Serve with gravy in the dish, and bread sauce in a tureen. To the sausage meat, if used, add a few bread crumbs and a beaten egg. Turkey is sometimes stuffed with truffles; they are prepared thus: they must be peeled, and chopped, and pounded in a mortar, in quantities of a pound and a half; rasp the same weight of the fat of bacon, and mix it with the truffles. Stuff the turkey with it; this stuffing is usually placed in the turkey two days previous to cooking, it is supposed to impart a flavor to the flesh of the fowl. Cut thin slices of fat bacon, and place over the breast of the turkey. Secure it with half a sheet of clean white paper, and roast. Two hours will roast it.

TURKEY BOILED.—A hen bird is considered the best. It may be stuffed with truffles, or sausage meat. Boil it in a clean floured cloth; throw some salt into the water in which it is boiled. Cover cloth, and simmer for two hours, removing the scum frequently. Serve with white sauce, or parsley and butter.

TURKEY HASHED.—Cut up the remains of a roasted turkey, put it into a stewpan with half a gill of sherry; shallots, truffles, mushrooms, chopped parsley, salt, pepper, and a little stock; boil half an hour, and reduce to a thick sauce. When ready, add a pound of anchovies and a squeeze of lemon. Skim the sauce free from fat, and serve all together.

TURKEY LEGS BROILED.—Braise some undressed legs of turkey until tender, dip them in melted butter, or clear salad oil; broil them a fine brown color, and serve with sauce.

GOOSE.—If a goose is tender under the wing, and you can break the skin easily by running the head of a pin across the breast, there is no danger of its being tough. A goose should be dressed in the same manner, and roasted the same length of time as a turkey.

TO ROAST A GOOSE.—Goose in itself is of a strong rich flavor, and requires both nicety in the cooking, as well as in the stuffing, to obviate that strength of flavor. There are many modes of stuffing; for one mode, take two moderate sized onions, and boil them rapidly ten minutes, then chop them finely, mince sage to the quantity of half the onion, add of powdered bread twice as much as of onion, pepper and salt it, introducing a little cayenne, and then bind it with the beaten yolk of an egg. Potatoes mashed are sometimes introduced, but not frequently, into the body; they should be mashed with floury potatoes mixed with a little fresh butter and cream, rather highly seasoned with cayenne and salt. Both ends of the goose should be secured when trussed, that the seasoning may not escape. It should be roasted before a quick fire, and kept constantly basted; a piece of white paper may be placed over the breast while roasting, until it rises, and then it may be removed; it will take from an hour and a half to an hour and three quarters; serve with a rich brown gravy and apple sauce.

Previous to sending to table, a flavoring may be made as follows: to a dessertspoonful of made mustard, add a quarter of a teaspoonful of cayenne

pepper, about the same quantity of salt, mix it evenly with a glass of port wine, and two glasses of rich gravy, make it hot, cut a slit in the apron of the goose, and pour it through just previously to serving.

Roast Goose.—Boil one dozen potatoes; pare and roast them with a quarter of a pound of butter, one onion chopped, a spoonful of sweet marjoram finely rubbed, with salt and pepper to taste; mash all well together; then have the goose well washed, dry the inside with a towel and season with sage, pepper and salt. Put in the dressing; season the outside with pepper and salt to taste; place it in the pan, dredge a little flour over, and one teaspoonful in the pan with plenty of water for gravy; baste frequently, and when brown turn it over that all parts may be well done. Apple sauce or cranberry to serve up.

Dressing for Roast Pork or Goose.—Make a dressing as for goose, add one teaspoon of mustard, and one teaspoon salt, with a wine-glass of claret, and mix with the dressing before putting in the goose or pork, or pour this into the gravy.

Boiled Fowls.—Flour a white cloth, and put the fowls in cold water, let them simmer for three quarters of an hour; serve with parsley and butter, or oyster or celery sauce. The fowls may be covered with a white sauce if sent cold to table, and garnished with colored calf's foot jelly of the hue of beetroot.

Cold Fried Chicken.—Cut the chicken in quarters, and take off the skin, rub it with an egg beaten up, and cover it with grated bread seasoned with pepper, salt, grated lemon-peel, and chopped parsley, fry it in butter, thicken a little brown gravy with flour and butter, add a little cayenne pepper, lemon pickle, and mushroom catsup.

Ducks.—Are good stewed like pigeons, or roasted. Two or three onions in the dressing of wild ducks, takes out the fishy taste they are apt to have. If ducks or any other fowls are slightly injured by being kept long, dip them in weak saleratus water before cooking them.

To Roast Duck.—Ducks should be well plucked without tearing the skin, all the plugs being removed. Some cooks go so far as to skin the duck, holding it a minute by the feet in scalding water, that the skin may peel easier; clean the insides thoroughly with a little warm water, and stuff them with the same stuffing as for geese, using a little more bread for the sake of mildness; roast them before a brisk fire, but not too close, and baste very frequently; they will take from half an hour to an hour, according to the age and size: when the breast plumps, they will be just done; serve them with a rich brown gravy.

Duck Stewed, with Peas.—Truss a duck with the legs turned inside, which put into a stewpan with two ounces of butter and a quarter of a pound of streaked bacon, cut into small slices; set the stewpan over a moderate fire, occasionally stirring its contents until it becomes lightly browned, then add a tablespoonful of flour, and when well mixed a pint of stock or water, stir occasionally until boiling, when add twenty of the smallest sized onions, and a bunch of parsley, with a bay leaf; let the whole simmer for a quarter of an hour longer, or until the peas are quite tender, when take out the duck, draw out the string, and dress it upon the dish; remove the parsley and bay leaf, season the peas and sauce with a little pepper, salt, and sugar, pour over the duck, and serve.

Pigeons.—Take out the inwards, and stuff the pigeons with a dressing prepared like that for turkeys, lay them in a pot with the breast side down. Turn in more than enough water to cover them. When stewed nearly tender, put in a quarter of a pound of butter to every dozen of pigeons—mix two or three teaspoonfuls of flour, with a little water, and stir into the gravy. If you wish to brown them, put on a heated bake pan lid, an hour before they are done, or else take them up when tender, and fry them in pork fat. They are very good split open and stewed, with a dressing made and warmed up separately with a little of the gravy. Tender pigeons are good stuffed and roasted. It takes about two hours to cook tender pigeons,

and three hours tough ones. Roast pigeons should be buttered when put to the fire.

Pigeons Roasted.—Veal stuffing for pigeons, it improves the flavor; they must be fresh and well cleaned; butter and parsley may be served with them; but parsley alone as a stuffing, though frequently used, is by no means so palatable as the veal stuffing, or one made with veal, the fat of bacon, and the crumbs of bread soaked in milk, and well seasoned. They are sometimes stuffed with truffles, or chestnuts and bacon, as turkey, covered with thin slices of fat bacon enwrapped in vine leaves instead of paper. They receive a fine flavor, but are they worth so much trouble?

Pigeons—Broiled.—Split the backs, season them highly, lay them over a clear, brisk fire, and serve with mushroom sauce.

Pigeons Stewed.—Take a white cabbage, cut it as if for pickling, then rinse it in clear cold water, drain it well, and put it into a saucepan with equal quantities of milk and water, boil it, strain off the milk, and take a portion of the cabbage and lay it in a stewpan; soak the pigeons for half an hour in cold milk and water, season them well with salt and pepper, adding a little cayenne; then place them in the stewpan with the cabbage, cover them over with what remains, add some white broth, stew slowly until the pigeons are tender, thicken with a little cream, flour, and butter, let it boil, and serve up the pigeon with a purée of the cabbage.

Pigeons in Jelly.—Make some jelly of calf's foot, or if you have the liquor in which a knuckle of veal has been boiled, it will answer the same purpose; place it in a stewpan with a bunch of sweet herbs, a blade of mace, white pepper, a slice of lean bacon, some lemon peel, and the pigeons, which truss and prop their necks up to make them appear natural; season to your palate. Bake them; when they are done remove them from the liquor, but keep them covered close, that their color may be preserved. Remove the fat, boil the whites of a couple of eggs with the jelly to clear it, and strain it; this is usually done by dipping a cloth into boiling water, and straining it through, as it prevents anything like scum or dirt sweeping through the strainer. Put the jelly rough over and round the pigeon.

To Pot Pigeons.—Season them well with pepper, cayenne, a little mace, and salt, pack them closely in a pan, cover them with butter, and bake them; let them get cold, then take off the fat, and put the pigeons into pots, pouring melted butter over them.

Wood Pigeons.—May be dressed exactly as tame pigeon, save that they require rather less time in the cooking, and the gravy or sauce should be richer and of higher flavor.

Fowl Broiled.—Separate the back of the fowl, and lay the two sides open; skewer the wings as for roasting, season well with pepper and salt, and broil; send to table with the inside of the fowl to the surface of the dish, and serve mushroom sauce; it is an admirable breakfast dish when a journey is to be performed.

To Roast Pheasants.—In preparing pheasants for roasting, the toes may be cut off the feet, but the heads should not be removed from the birds; the feathers are sometimes allowed to remain upon the heads and tails, the feathers being in the latter case brought forward, so as to decorate each side of the birds. When any of the plumage is in this way retained, the pheasants require to be enveloped in oiled or buttered paper; but one or two of the best feathers may be stuck into the tail after the birds are dressed, if more convenient. Merely baste pheasants with butter, and do not dredge them with flour while they are down at the fire. From half an hour to forty minutes is considered ample to roast them in. It is almost needless to say that feathered or what is called *wing* game, of any kind, is rarely stuffed. Bread sauce alone is esteemed proper to accompany it at table—a little very rich gravy being served with it in the dish. Cold roasted pheasant and chutney sauce form a delicious dish for breakfasts and luncheons.

To Stew Pheasants.—Truss the pheasant as for boiling; put it into a saucepan which is just large enough to hold it; pour in enough veal gravy, and stew it very slowly, till sufficiently done; add about a score of chestnuts, previously boiled and blanched; one or two sliced artichoke bottoms, already dressed; pepper, salt, a glass of white wine, and a little butter rolled in flour. Make all hot; squeeze into it the juice of half a lemon; put the pheasant in a dish, and pour the sauce over it. Some game forcemeat balls may be added, if fancied.

Partridge.—Yellow legs and a dark bill are signs by which a young bird may be known, and a rigid vent when fresh. When this part is green the bird is stale.

To Bone Birds.—Begin to bone any birds by first taking out the breast bone, when you will have sufficient space to remove the back with a sharp knife, and then the leg bones; the skin must not be broken but the meat of the legs must be pushed inwards.

Partridge—Broiled.—Let the partridge hang until longer would make it offensive, then split it, and take a soft clean cloth and remove all the moisture inside and out; lay it upon a gridiron over a very clear fire, and spread a little salt and cayenne over it. When it is done, which will be in twenty minutes, rub a little butter over it, and send it to table with mushroom sauce.

Partridge Stewed.—Partridges are differently trussed for stewing to what they are for roasting, the wings are fixed over the back, and the legs skewered. Take a piece of bacon, and put it with a small piece of butter in a stewpan; fry it brown, put in the partridges so that the bacon covers the breast, and let them be very brown: add half a pint of gravy. Boil a cabbage, so that it is ready by the time the partridges are fried brown, chop it with pepper and salt, and a lump of butter. Add it with the gravy to the partridges, and stew slowly for an hour; when dishing, place the bacon in the centre of the dish, lay the partridges upon it, and make a wall of the cabbage round. While stewing, turn the partridges often.

To Roast Grouse.—Dress the birds as above, and serve on a toast; they will require twenty minutes less than black cock in roasting. When they are sent to table without the toast, serve with fried bread crumbs and bread sauce, or brown gravy instead of the bread crumbs.

Stuffing for a Hare.—After having either scraped or scalded the liver, scrape some fat bacon, a little suet, some parsley, thyme, knotted-marjoram, a little shallot, a few crumbs of bread, pepper and salt, a few grains of nutmeg, beat it all well in a mortar with one egg, but if your hare is boned it will take more. You can dress a boned hare two ways: either taking each bone out but the head and the point of the tail; but this will not keep so good a shape as if you only took out the back and rib bones, leaving the shoulders and legs on; this way, when stuffed, will keep its shape best.

Plovers.—These birds must not be drawn, roast them before a brisk fire, but at a distance, and serve on toast with melted butter.

Partridge Roast.—Let the bird hang as long as it can be kept without being offensive; pick it carefully, draw, and singe it; wipe the inside thoroughly with a clean cloth; truss it with the head turned under the wing, and the legs drawn close together, not crossed. Flour them when first laid to the fire, and baste them plentifully with butter. Serve them with bread sauce and good brown gravy.

To Broil Grouse.—Carefully pluck the birds; remove the first joints of the wings, the heads, and the legs at the knees; split the grouse evenly in half; pepper them, dip them in butter made liquid, and sprinkle them with bread-crumbs; repeat this process; make a gridiron hot over a clear fire, rub it with suet, and lay upon it the grouse; being careful to do the insides first, or the gravy will get too quickly drawn, and you will not be able to turn the birds. When they are done enough, and are nicely browned, dish them upon a poivrade or tomato sauce rendered rather piquante.

Grouse Pie.—Pluck and singe a leash of grouse; cut off the legs at the drumsticks: season the birds well with pepper, salt, chopped thyme, and parsley; lay a slice of veal at the bottom of the pie dish; place upon it the grouse; put a rim of good light crust round the edge of the dish; add a little gravy made by boiling down the heads, &c., of the birds; cover the pie with a lid of paste, and bake it for about an hour. A few mushrooms or truffles may be advantageously introduced when they are at command.

Grouse Soup.—In some good well seasoned stock, stew a brace of grouse until they are tender; take them up; cut off the primest flesh; beat this in a mortar until it is a smooth paste; press it through a sieve; simmer down the bones in the stock until the latter is well reduced; strain it into another saucepan; add the purée; give all a good warm up, but do not allow it to reach boiling point. Serve it in a tureen into which you have put a couple of glasses of port wine and a dessertspoonful of beaten loaf sugar.

Partridge Salad.—Carve a cold roasted partridge; place the members in a dish; add lettuce hearts in quarters, fillets of Gorgona anchovies, pickles, pieces of clear jelly, hard-boiled yolks of eggs in slices, celery, tomatoes or anything likely to give effect to the dish; pour over it a Mayonnaise sauce, or add a salad dressing at table. The flesh, sliced and divested of bone may be employed instead of the members of the bird, if preferred.

To Roast Wild Duck.—Cut off the pinions and scald the feet; truss the birds; rub them outside with their livers: baste them with plenty of butter; and immediately gravy begins to run from them when they are roasting you may consider they are done. They should not be stuffed, but a good piece of butter may be placed in the insides. When you serve them, score the flesh on the breasts lengthwise; sprinkle over them cayenne pepper, and squeeze upon them the juice of a lemon. Send brown gravy or shallot sauce to table, separately.

To Stew Wild Duck.—Simmer together for ten minutes some sage, sweet herbs, pepper, salt, port wine, lemon juice, and gravy; meanwhile partially roast a tender, fat wild duck; cut it up; add it to the sauce, and do all slowly till you think it is sufficiently done. Strain the sauce over the bird when you have placed it in a dish.

To Roast Snipe.—These are soon roasted, quarter of an hour being quite long enough for them; they, of course, should not be drawn. Place a piece of thin toast under each while they are being roasted, and only baste them with butter without dredging them with flour. French cooks place bacon fat over the birds before roasting them; but this is not needful. Immediately they are done send them to table upon the pieces of toast, placed in a hot dish.

To Hash Snipe.—Cut the meat from the bones and roughly mince it; stew down the bones and insides together with herbs, shallots, Champagne, and stock; when this is pretty thick strain it; add to it the flesh of the snipes; make all thoroughly hot, by which time the birds will be sufficiently done, and serve it in a dish garnished round the margin with sippets of bread fried in butter, and each sippet decorated with an egg nicely poached and trimmed.

To Roast Quails.—Quails cannot be too fresh when they are dressed; draw and truss them; wrap round each either a vine or laurel leaf; then fasten over this a thin slice of bacon. Roast them until the gravy begins to run from them, and serve upon toast.

To Roast Woodcock.—Carefully pluck the birds, but omit drawing them; they should not be spitted, but suspended with the vent downwards; place a nice round of toast underneath to catch the trail; about twenty minutes' roasting will be enough; baste simply with fresh butter, and send the birds to table as hot as possible. They should be laid upon the toast in a dish, and slices of orange may be employed as a garnish. Bread sauce and a rich gravy are generally sent to table apart.

To Pot Woodcock.—Be careful to pluck and thoroughly singe the birds you intend to pot; skewer the bills through the thighs; draw the legs one through another, and fix the feet upon the breasts; season the woodcocks with salt, pepper, and beaten mace; put them into a deep dish or jar, and add enough fresh butter to cover them with when it is melted. Bake them for forty minutes; when done, place them upon a clean dish, so as to let the gravy drain from them as they cool. Put them into potting jars when they are quite cold; add to them some of the butter in which they were dressed, but see that it is free from sediment; fill up with freshly clarified butter, and cover the jars close.

To Boil Woodcock.—Pluck, and in this case draw the birds; truss them, and boil them for ten minutes in nice clear, savory beef stock; while they are doing, chop the trails, &c., and the livers; mix these in a saucepan with a few tablespoonfuls of the liquor in which you boil the birds; add a piece of butter rolled in flour, two tablespoonfuls of port wine; and when the butter is melted put in a teacupful of fried bread-crumbs; as soon as these are hot place the woodcocks in a dish, and mask them with the sauce; garnish with thin slices of fresh lemon. The birds should be young and tender for this way of dressing.

To Broil Hare.—The best parts of a cold roast hare are very good broiled. The pieces should be cut and trimmed so as to be as nearly as possible of one size; dip them in olive oil, well season them, and do them quickly upon a gridiron over a clear fire till they are beautifully brown. When the hare is previously uncooked, it should be cut up and the pieces boned; then soak them in a marinade of oil seasoned with salt, pepper, chopped parsley, and shallot; at the end of an hour or so take the hare out of this marinade, roll it in fine bread-crumbs, grill it quickly, and serve it upon a sauce *à la Tartare*.

To Roast a Hare.—First stuff it with a forcemeat made by chopping the liver together with some anchovy, bacon fat, bread-crumbs, thyme, and marjoram; add shred lemon rind, salt and pepper, and moisten it with sufficient egg and port wine; sew up the hare; truss it, and put it to roast; baste it for half an hour with milk; then use butter; and dredge it now and then with flour, so as to give it a fine froth. An hour is long enough to roast a leveret, but a good sized hare will take about half as long again. Red currant jelly and rich game, or beef gravy, should be served separately.

To Stew Hare.—Skin the hare; cut it up; do not wash or wipe it; toss it in butter for about five minutes; add a quart of brown stock nicely flavored; stew all together very slowly till the meat is sufficiently tender; add some port wine, flour, and butter; and serve it with small sippets of fried bread.

Rabbit Boiled.—Wash the rabbit thoroughly, truss it firmly with the head turned and skewered to the sides, put it into sufficient boiling water to keep it quite covered until it is cooked, simmer it gently for thirty or forty minutes; when very young they will require less time than this. Cover it with rich white sauce, mix it with the liver parboiled, finely pounded, and well seasoned with cayenne and lemon-juice: or serve with onion sauce.

Rabbit Pie.—Cut a rabbit into joints, splitting the head in half, and lay them in lukewarm water for half an hour; then dry them upon a cloth, season well with pepper and salt, and with chopped shallots, parsley, two bay leaves, and a teaspoonful of flour; cut three-quarters of a pound of streaked bacon into square pieces, lay in the pieces of rabbit and bacon together, in a pie dish, pour in a little water, cover with paste, and bake in a moderate oven.

Rabbit Roasted.—Truss the rabbit, and stuff it with the liver minced raw and mixed with grated bread, ham, butter or suet, and chopped parsley, seasoned with a little lemon-thyme, grated nutmeg, salt, and pepper, and bound with beaten egg. Sew it up, set it down before a quick fire, and baste it with butter. Serve with gravy, or melted butter with lemon-juice in it.

RABBIT STEWED.—Wash a rabbit thoroughly, let it lie for two or three hours in cold water, cut it into joints, dry them upon a cloth, dredge them with flour, fry them of a light brown with butter, and stew them in the following sauce: brown three ounces of butter in a stewpan, with a tablespoonful of flour, a minced onion, some pepper and salt; add a pint of gravy and the rabbits, stew them till they are tender, and just previous to serving, stir in a tablespoonful of ketchup. When the rabbit is to be dressed with a white sauce, it should not be fried, but stewed in the white stock, which is seasoned with white pepper and salt, and thickened with a piece of butter mixed with flour. A few minutes before serving add a little cream, and a tablespoonful of lemon pickle.

VENISON, HAUNCH OF, ROASTED. —Take a haunch weighing twelve pounds, and require the butcher to trim off the chine-bone and the end of the knuckle; wrap two or three folds of buttered paper, or the caul of a lamb, closely around the haunch to prevent the fat from burning; spit the haunch, set it before a slow fire, and roast it three hours, basting it frequently with salt and water, to prevent the paper for burning off; then remove the paper or caul, baste the haunch with butter, set it nearer the fire, and give it a light brown; continue to baste with butter; dredge it lightly with flour, and when it is well frothed and browned on all sides, it is done; wrap a ruffle of cut paper round the knuckle bone and send the haunch to table with a plain gravy, made from the trimmings of the venison, and seasoned only with a little salt, served with currant jelly. If the venison has hung three or four weeks (and it ought to hang as long before cooking) it will be necessary to remove the outer skin before roasting.

VENISON HASHED.—Cut nice slices from the venison which may have been left cold, not forgetting to put plenty of fat with it, flour it, place it in a saucepan, pour over it three half pints of stock gravy, a gill of port wine, a little currant jelly, and two tablespoonfuls of ketchup; let it simmer gently, it must not boil, or it will make the venison hard; as soon as it is thoroughly hot, add a little salt and cayenne pepper; serve with sippets round the dish. There should be currant jelly on the table.

VENISON BROILED.—Cut thin slices of venison, mix stale crumbs of bread with salt, pepper, and spices, egg the slices, dip in the seasoned bread, broil over a clear fire, and serve with a gravy sauce.

VENISON FRIED.—Cut the meat into thin slices, and make a gravy of the bones. Fry it of a light brown, and keep it hot before the fire. Put butter rolled in flour into the pan, and stir it till thick and brown. Put in half a pound of powdered sugar with the gravy made from the bones, and some red wine. Have it the thickness of cream; squeeze in a lemon, warm the venison in it, put it in the dish, and pour the sauce over.

VENISON STEAKS.—From a small neck of venison, neatly cut four or five steaks; remove a portion of the bone from each, and trim them in the French fashion—that is to say, divest them of all superfluous parts; and give each steak a good blow with the blade of the chopper, so as to flatten the steaks evenly. Rub a gridiron with a bit of the fat; place the venison upon it; and broil it over a clear charcoal fire until the steaks are done. Serve with a sauce made by simmering together red wine and currant jelly until they form a syrup.

VENISON CHOPS.—Cut the chops as nearly one size as possible; flatten them nicely; lard them with slips of fat bacon; soak them for a day in a marinade; drain them; toss them in scalding hot olive oil; do them quickly over a brisk fire; when they are nicely browned arrange them *en couronne* in a dish; and serve them with either a poivrade or tomato sauce.

TO MINCE VENISON.—Mince rather finely some cold roasted venison divested of sinews, skin, &c. Prepare an excellent poivrade sauce; when this is perfectly hot in a saucepan, put into it the venison; add a small piece of fresh butter; shake it gently over the fire for a few minutes, but on no account let it boil. Serve it in a dish decorated with small sippets of toast, nicely glazed.

THE SCIENCE OF CARVING.

The carving knife should be light, of middling size, and of a fine edge. *Strength* is less required than *skill* in the manner of using it; and to facilitate this, the butcher should be directed to divide the *joints* of the bones of all carcass joints of mutton, lamb, and veal (such as neck, breast, and loin,) which then may easily be cut into thin slices, attached to the bones. If the whole of the meat belonging to each bone should be too thick, a small slice may be taken off between every two bones.

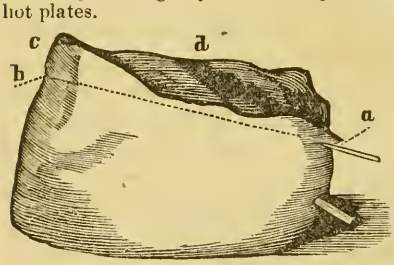
The more fleshy joints (as fillets of veal, leg, or saddle of mutton, and beef), are to be helped in thin slices, neatly cut, and smooth. Observe to let the knife pass down to the bone in the mutton and beef joints.

The dish should not be too far off the carver, as it gives an awkward appearance, and makes the task more difficult. Attention is to be paid to help every one to a part of such articles as are considered best.

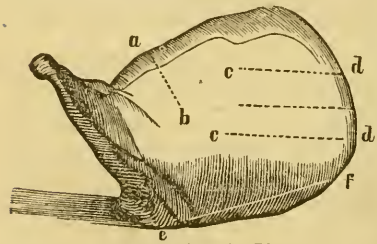
In helping fish, take care not to break the flakes, which in cod and very fresh salmon are large, and contribute much to the beauty of its appearance. A fish knife not being sharp, divides it best. Help a part of the roe, milt, or liver, to each person. The heads of carp, part of those of cod and salmon, sounds of cod, and fins of turbot, are likewise esteemed niceties, and are to be attended to accordingly.

In cutting up any wild fowl, duck, goose, or turkey, for a large party, if you cut the slices down from pinion to pinion, without making wings, there will be more handsome pieces.

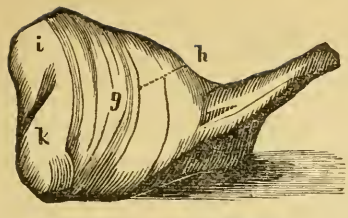
1. Sirloin of Beef.—This may be begun at either end, or by cutting in the middle. It is usual to inquire whether the outside or inside is preferred. For the outside, the slice should be cut down to the bones, and the same with every following helping. Slice the inside likewise, and give with each piece some of the soft fat. The inside, done in the following manner, is excellent: Have ready some shallot vinegar, boiling hot; mince the meat large, and a good deal of the fat; sprinkle it with salt, and pour the vinegar and gravy on it. Help with a spoon as quick as possible, on hot plates.



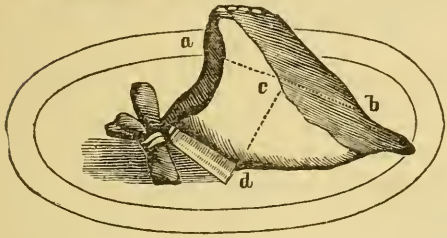
2. Aitch or Edge-Bone of Beef.—Cut downwards, an inch thick, all the length from *a* to *b*, and then help. The soft fat, which resembles marrow, lies at the back of the bone, below *d*—the firm fat must be cut in horizontal slices at the edge of the meat, *c*. The skewer used in keeping the meat together while boiling, is shown at *a*, which should be drawn out before served up; or, if necessary to leave it in, place instead one of silver.



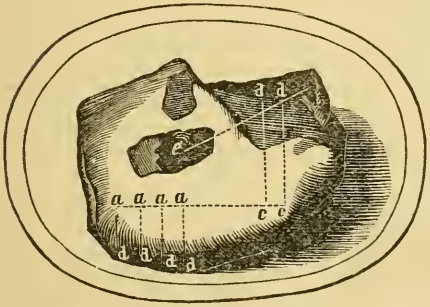
3. Shoulder of Mutton.—This is a very good joint, and by many preferred to the leg; for, if properly roasted, it abounds in gravy, and produces many nice bits. The figure annexed represents it as laid in the dish, with its back uppermost. It should first be cut in the hollow part, in the direction *a*, *b*, and the knife passed deep to the bone. The best part of the fat lies on the outer edge, and it is to be cut out in thin slices, in the direction *f*. If many are at the table, and the hollow part cut on the line *a*, *b*, is eaten, some very good and delicate slices may be cut out in each side of the ridge of the blade bone, in the direction of *c*, *d*. The



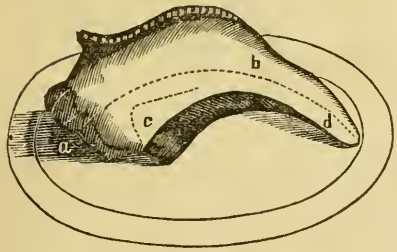
line between these two dotted lines is that in the direction of which the edge or ridge of the blade bone lies, and cannot be cut across. It is necessary to wind writing paper around the shank, as in the leg, provided you wish to handle it. The lower side of the shoulder has two cuts abounding in gravy. The part in the direction *i, k,* is lean; the other, *g, h,* is very fat.



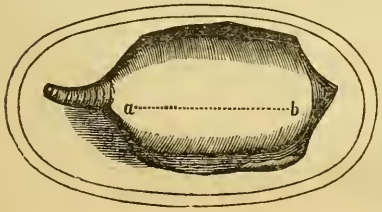
4. Knuckle of Veal.—A knuckle of veal cuts in neat slices only in one direction, viz: from *a* to *b*. The line *d, c,* divides two bones, which it is necessary to separate in order to get at the best marrowy fat portion—also cut asunder the knuckle bones.



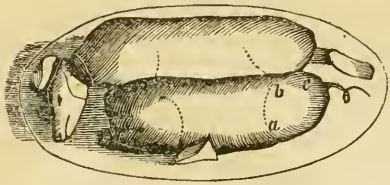
5. Roasted Breast of Veal.—Cut to the left on the first line *d, c;* then cross from *c* to the most distant *a*. The lines *a, d, a, d,* &c., represent the directions in which the brisket, or gristly part should be divided; *d, c,* show the course of the ribs, and *e* is the sweetbread.



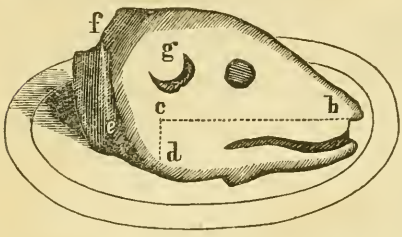
6. A Spare Rib.—Cut out first a slice from the fleshy portion, following the line *a, b*. This will give a due proportion of fat and lean. After this part is taken away, the bone lying in the direction *d, b, c,* should be separated, breaking it off at the joint *c*.



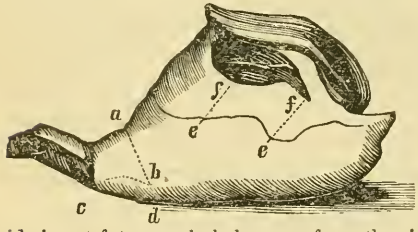
7. Saddle of Mutton.—Cut long, thin slices from the tail to the end, viz.: from *a* to *b*, beginning close to the back bone. If a large joint, the slice may be divided. Cut some fat from the sides.



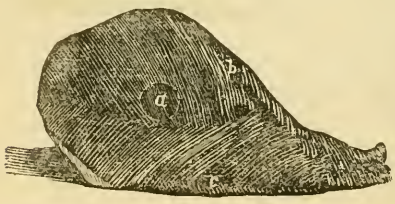
8. Pig.—The cook usually divides the body before it is sent to the table, and garnishes the dish with the jaws and ears. The first thing is to separate the shoulder from the carcass on one side, and then the leg, according to the direction given by the dotted line *a*, *b*, *c*. The ribs are then to be divided in about two helpings, and an ear or jaw presented with them, and plenty of sauce. The joints may either be divided into two each, or pieces may be cut from them. The ribs are reckoned the finest part, but some people prefer the neck and between the shoulders.



9. Half a Calf's Head, Boiled.—Be careful and get a young one, as they look much handsomer served up, and besides are more tender. First cut in the direction *c*, *b*. The throat bread is considered the choicest part; it lies in the fleshy portion, near the termination of the jaw-bone, and the line *c*, *d*, shows the direction to cut into it. On the under part of the lower jaw there is some very nice meat; and about the ear, *g*, some fat rather gristly, but highly esteemed. The part near the neck is very inferior. Sometimes the bone in the line *f*, *e*, is cut off, but this is a coarse part. The sweet tooth is quite a delicacy—it lies back of all the rest, and in a young calf is easily extracted with the knife. Many like the eye, which you must cut out with the point of your knife, and divide in two. Under the head is the palate, which is reckoned a nicety.

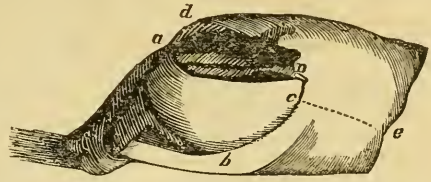


10. Leg of Mutton.—A leg of wether mutton (which is best flavored), may be known at the market by a round lump of fat at the edge of the broadest part, a little above the letter *a*. The best part is midway between the knuckle and farther end. Begin to help there, by cutting thin slices to *b*. If the outside is not fat enough, help some from the side at the broad end, in slices from *e* to *f*. This part is most juicy, but many prefer the knuckle, which, in fine mutton, will be very tender though dry. There are very fine slices in the back of a leg—turn it up, and cut the broad end, not in the direction you did the other side, but lengthwise. To cut out the cramp bone, take hold of the shank (which should previously be wound round with half a sheet of fool's-cap paper) with your left hand, and cut down to the thigh bone at *g*, then pass the knife under the cramp bone, in the direction of *g*, *d*.

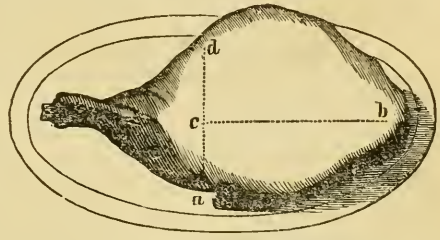


11. Ham.—Ham may be cut three ways; the common method is to begin in the middle, by long slices from *b* to *c*, from the centre, through the thick fat. This brings to the prime at first, which is likewise accomplished by cutting a small, round hole on the top of the ham, as at *a*, and with a sharp knife enlarging

that by cutting successive thin circles—this preserves the gravy and keeps the meat moist. The last, and most saving way, is to begin at the hock end (which many are most fond of), and proceed onward. Ham that is used for pies, &c., should be cut from the under side.



12. Fore Quarter of Lamb.—Separate the shoulder from the breast and ribs by passing the knife under, in the direction of *a*, *b*, *c*, and *d*. Be careful to keep it toward you horizontally, to prevent cutting the meat too much off the bones. If grass lamb, the shoulder being large, put it into another dish. Squeeze the juice of half a Seville orange or lemon on the other part, and sprinkle a little salt and pepper; then separate the gristly part from the ribs, in the line *e*, *c*, and help either from that or from the ribs, as may be chosen.



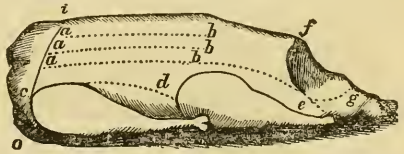
13. Haunch of Venison.—First cut it down to the bone, in the line *d*, *c*, *a*, then turn the dish with the end *a* towards you; put in the point of the knife at *c*, and cut it down as deep as you can in the direction *c*, *b*. Thus cut, you may take out as many slices as you please, on the right or left. As the fat lies deeper on the left, between *b* and *a*, to those who are fond of fat, as most venison eaters are, the best flavored and fattest slices will be found on the left of the line *c*, *b*, supposing the end *a* turned toward you. Slices of venison should not be cut too thick nor too thin, and plenty of gravy given with them.

14. Round of Beef.—This is cut the same way as a fillet of veal. It should be kept even all over. When helping the fat, be careful not to hack it, but cut it smooth. A deep slice should be taken off before you begin to help, as directed in the edge-bone.

15. Brisket of Beef.—This must be cut lengthwise, quite down to the bone, after separating the outside or first slice, which must be cut pretty thick.

16. Leg of Pork.—This joint is sent to the table, whether boiled or roasted, as a leg of mutton, roasted and cut up in the same manner. The close, firm flesh about the knuckle is by many reckoned best.

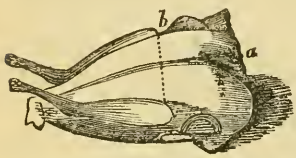
17. Haunch of Mutton.—This is formed by the leg and part of the loin, cut so as to resemble a haunch of venison, and is to be helped at table in the same manner.



18. Goose.—Turn the neck end of the goose toward you, and cut the whole breast in slices on each side of the bird, but only remove them as you help each person, unless the company is so large as to require the legs likewise. Turn the goose on one side, and then take off the leg by putting the fork into the small end of the leg bone, pressing it close to the body; and, having passed the knife in the line *e*, *d*, turn the leg back and, if a young bird, it will easily separate.

To take off the wing, put your fork into the small end of the pinion, and press it close to the body; then put in the knife at *c*, and divide the joint, taking it down in the direction *c*, *d*. Nothing but *practice* will enable people to hit the joint exactly at the first trial. When the leg and wing of one

side are done, go on to the other; cut off the apron in the line *f, e, g,* then take off the merry-thought in the line *o, i.* The neck bones are next to be separated as in a fowl, and all other parts divide the same.

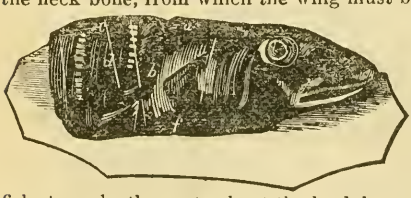


19. A Fowl.—A boiled fowl's legs are bent inwards, but before it is served, the skewers are to be removed. Lay the fowl on your plate, and place the joints as cut off on the dish. Take the wing off, in the direction of *a* to *b*, in the annexed engraving, only dividing the joint with your knife; and then, with your fork, lift up the pinion, and draw the wings towards the legs, and the muscles will separate in a more complete form than if cut. Slip the knife between the leg and body, and cut to the bone, then, with the fork, turn the leg back, and, if the bird is not old, the joint will give way. When the four quarters are thus removed, take off the merry-thought from *a*, and the neck bones, these last by putting in the knife at *c*, and pressing it under the long, broad part of the bone, in the line *c, b;* then lift it up, and break it off from the part that sticks to the breast. The next thing is to divide the breast from the carcass, by cutting through the tender ribs, close to the breast, quite down to the end of the fowl; lay the back up, put your knife into the bone, half way from the neck to the rump, and on raising the lower part, it will readily separate. Turn the neck towards you, and very neatly take off the two sidesmen, and the whole will be done. As each part is taken off, it should be turned neatly on the dish, and care should be taken that what is left should go properly from the table. The breast and wings are looked upon as the best parts, but the legs are most juicy in young fowls. After all, more advantage will be gained by observing those who carve well, and a little practice, than by any written direction whatever.

20. Partridge.—This bird is cut up in the same way as a fowl. The best parts are the wings, breast, and merry-thought; but the bird being small, the two latter are not often divided. The wing is considered the best, and the tip is reckoned the most delicate morsel of the whole.

21. Pigeons.—Pigeons are considered very fine eating. It is usual to cut them in half, either from top to bottom, or across. The lower part is generally thought best.

22. Turkey.—Fix your fork firmly in the lower part of the breast, so as to have full command of the turkey. Slice down each side of the centre of the breast, two or three lines lengthwise with the body; then take off the leg on one side, holding the knife in a sloping direction, the point turned towards the end of the body. This done, cut off the wing on the same side, in a line nearly parallel with the length of the turkey. When you have thus separated the wings and legs, take off from the breast bone the parts you before sliced down. Be very attentive, in separating the wing, not to cut too near the neck, or you will find yourself interrupted by the neck bone, from which the wing must be taken.



23. Cod's Head.—Fish in general requires very little carving, the fleshy parts being those principally esteemed. A cod's head and shoulders, when in season, and properly boiled, is a very genteel and handsome dish. When cut, it should be done with a fish trowel; the parts about the back-bone, or the shoulders, are by far the firmest and best. Take off a piece quite down to the bone, in the direction *a, b, c, d,* putting in the spoon at *a, c,* and with each slice of the fish give a piece of the round, which lies underneath the back-bone, and lines it, the meat of which is thin, and a little darker colored than the body of the fish itself. This may be got by passing a spoon under it, in the direc-

tion *d, f*. About the head are many delicate parts, and a great deal of the jelly kind. The jelly part lies about the jaw-bone, and the firm parts within the head. Some are fond of the palate, and others the tongue, which likewise may be got by putting a spoon into the mouth.

To Roast Beef.—The primest parts are roasted, except the round, which should be boiled; the ribs make the finest roasting joint.

Where a small quantity is required, it is better for the bones to be cut out, and the meat rolled; this should be done by the butcher, who will not only cut cleaner, but skewer the parts into a fillet with more firmness and neatness than the cook, who is not expected to be as expert with the knife and the skewer as the butcher. The tops of the ribs are frequently cut off into pieces of three or four pounds; this piece, though occasionally roasted, should be salted; it then approaches in flavor to the brisket.

In roasting the ribs, or any piece of beef, the precautions mentioned respecting placing it too near the fire must be observed; and where there is much fat, and it is desired to preserve it from being cooked before the lean, it may be covered with clean white paper skewered over it; when it is nearly done the paper should be removed, a little flour dredged over it, and a rich, frothy appearance will be obtained. The joint should be served up with potatoes and other vegetables; the dish should be garnished round the edges with horse-radish scraped into thin curls. This receipt will suffice for all the other roasting parts of beef.

Roast Beef, No. 2.—The tender loin and first and second cuts off the rack are the best roasting pieces—the third and fourth cuts are good. When the meat is put to the fire, a little salt should be sprinkled on it, and the bony side turned towards the fire first. When the bones get well heated through, turn the meat, and keep a brisk fire—baste it frequently while roasting. There should be a little water put into the dripping pan when the meat is put down to roast. If it is a thick piece, allow fifteen minutes to each pound to roast it in—if thin, less time will be required.

To Cook the Inside of the Sirloin.—Take out the inside of the sirloin in one piece, put it into a stew-pan, with sufficient good gravy to cover it; season with mixed spice, pepper, salt, and cayenne, and a spoonful of walnut ketchup; more of the latter may be added, if the quantity made should require it to flavor; serve with pickled gherkins, cut small.

Fillet of Beef Roasted.—The fillet, which comes from the inside of the sirloin, may be larded or roasted plain: for high dinners it is larded. Baste with fresh butter. It must be a large fillet which takes longer than an hour and twenty minutes; serve with tomato sauce, and garnish with horse-radish, unless served with currant jelly, then serve as with venison or hare.

A Salt Round of Beef.—Use the spice as for the fillet of beef, but salt as usual for a round of beef. Let it lie for a week, frequently rubbing it; boil it in a cloth; send up carrots, and turnips, and suet dumplings, and a little gravy from what it was boiled in, adding a little consommé, or it will be too salt. Serve with young cabbages.

Beef Steak.—The tender loin is the best piece for broiling—a steak from the round or shoulder clod is good and comes cheaper. If the beef is not very tender, it should be laid on a board, and pounded, before boiling or frying it. Wash it in cold water, then lay it on a gridiron, place it on a hot bed of coals, and broil it as quick as possible without burning it. If broiled slow it will not be good. It takes from fifteen to twenty minutes to broil a steak. For seven or eight pounds of beef, cut up about a quarter of a pound of butter. Heat the platter very hot that the steak is to be put on, lay the butter on, take up the steak, salt and pepper it on both sides. Beef steak to be good should be eaten as soon as cooked. A few slices of salt pork broiled with the steak makes a rich gravy with a very little butter. There should always be a trough to catch the juices of the meat when broiled. The same pieces that are good broiled are good for frying. Fry a few slices of salt pork, brown, then take them up and put in the beef. When brown on both sides, take it up, take the pan off from the fire, to let

the fat cool; when cool, turn in half a teacup of water, mix a couple of teaspoonfuls of flour with a little water, stir it into the fat, put the pan back on the fire, stir it till it boils up, and then turn it over the beef.

Beef Kidney, Fried.—Remove all the fat and the skin from the kidney, and cut it in slices moderately thin. Mix with a teaspoonful of salt, grated nutmeg, and cayenne pepper. Sprinkle over them this seasoning, and also parsley and eschalot, chopped very fine. Fry them over a quick fire until brown on both sides, then pour into a good gravy a glass of Madeira, and when the slices of the kidney are browned, pour it into the pan gradually; just as it boils throw in a spoonful of lemon juice, with a piece of butter the size of a nut. Have ready a dish, garnished with fried bread, cut in dice, and pour the whole into it.

Beef Kidneys, Stewed.—Procure a couple of very fine beef kidneys, cut them in slices, and lay them in a stew-pan; put in two ounces of butter, and four large onions cut into very thin slices; add to them a sufficiency of pepper and salt to season well. Stew them about an hour; add a cupful of rich gravy to that extracted from the kidney. Stew five minutes, strain it, and thicken the gravy with flour and butter; give it a boil up. Serve with the gravy in the dish.

Beef Heart Roasted.—Wash thoroughly, stuff with forcemeat, send it to table as hot as it is possible, with currant jelly sauce; it will take about forty minutes roasting.

Beef and Sauer Kraut.—Put about eight pounds of beef into cold water. When it comes to a boil, let it boil very fast for eight or ten minutes, not longer. Take it in a stewpan, covering it completely over with sauer kraut. Pour in a pint of thin gravy. Stew four hours, and serve with the gravy in a tureen or deep dish.

A Beef Stew.—Take two or three pounds of the rump of beef, cut away all the fat and skin, and cut it into pieces about two or three inches square, put it into a stewpan, and pour on to it a quart of broth; then let it boil, and sprinkle in a little salt and pepper to taste: when it has boiled very gently, or simmered two hours, shred finely a large lemon, adding it to the gravy, and in twenty minutes pour in a flavoring, composed of two tablespoonfuls of Harvey's sauce, the juice of the lemon (the rind of which has been sliced in the gravy), a spoonful of flour, and a little ketchup; add at pleasure two glasses of Madeira or one of sherry or port, a quarter of an hour after the flavoring, and serve.

Beef Hashed.—Take the bones of the joint to be hashed, and break them small; then stew them in a very little water, with a bunch of sweet herbs and a few onions; roll a lump of butter in flour, brown it in a stew-pan, pour the gravy to it, and add the meat to be hashed; two small onions in thin slices, a carrot also, and a little parsley shred finely; stew gently until the meat is hot through, and serve.

Tongue Boiled.— When taken fresh from the pickle, they require no soaking, unless they should have remained in it much beyond the usual time, or have been cured with a more than common proportion of salt; but when they have been smoked and highly dried, they should be laid for two or three hours into cold, and as much longer into tepid water, before they are dressed. If extremely dry, ten or twelve hours must be allowed to soften them, and they should always be brought very slowly to boil. Two or three carrots and a large bunch of savory herbs, added after the scum is cleared off, will improve them. They should be simmered until they are extremely tender, when the skin will peel from them easily. A highly dried tongue of moderate size will usually require from three and a half to four hours' boiling; an unsmoked one, about an hour less; and for one which has not been salted at all, a shorter time will suffice.

Beef Tongue, to Cure.—Throw a handful of salt over the tongue, seeing that it is sprinkled on both sides, and let it remain to drain until the following day; make a pickle of a tablespoonful of common salt, half that quantity of saltpetre, and the same quantity of coarse sugar as of salt;

rub this mixture well into the tongue, every day for a week; it will then be found necessary to add another tablespoonful of salt; in four more days the tongue will be cured sufficiently.

Some persons do not rub the pickle into the tongue, but let it absorb it, merely turning it daily; this method will be found to occupy a month or five weeks before it is cured. When the tongue is to be dried, affix a paper to it with a date; smoke over a wood fire four days, unless wrapped in paper, and then as many weeks will be required.

Tongue Pickled.—To three gallons of spring water add six pounds of common salt, two pounds of bay salt, two pounds of common loaf-sugar, and two ounces of saltpetre. Boil these over a gentle fire, and be careful to take off all the scum as it rises; when quite cold, it will be fit for use. Rub the tongue to be cured with fine salt, and let it drain for a day, in order to free it from the blood; then immerse it in the brine, taking care that every part of it shall be covered. The tongues should not remain more than from three to five days in the pickle. When the pickle has been in use for about three months, boil it up again gently and take the scum carefully off; add to it three pounds of common salt, four ounces of sugar, and one of saltpetre. It will remain good for many months.

Alamode Beef.—The round of beef is the best piece to alamode; the shoulder clod is good and comes lower; it is also good stewed, without any spices. For five pounds of beef, soak about a pound of bread in cold water till soft, then drain off the water, mash the bread fine, put in a piece of butter, of the size of a hen's egg, half a teaspoonful of salt, the same quantity of ground cloves, allspice, and pepper, half a nutmeg, a couple of eggs, and a tablespoonful of flour; mix the whole well together; then cut gashes in the beef, and fill them with about half the dressing, put the meat in a bake-pan, with lukewarm water enough to cover it; set it where it will stew gently for a couple of hours, cover it with a heated bake-pan lid. When it has stewed a couple of hours turn the reserved dressing on top of the meat, heat the bake-pan lid hot enough to brown the dressing, stew it an hour and a half longer. After the meat is taken up, if the gravy is not thick enough, mix a teaspoonful or two of flour with a little water, and stir it into the gravy; put in a little butter, a wineglass of wine, and turn it over the meat.

Potted Beef.—To a pound of common salt put a quarter of an ounce of saltpetre, and two ounces of coarse sugar. Rub three ounces of lean beef with this, and let it remain in the brine fifty hours. Drain and dry it; pepper it well with black pepper, and put it into a pan; cut half a pound of butter in slices, and lay round it; lay a paste crust over it, and bake it very slowly four hours and a half. Let it get cold, and then cut off the meat, being careful to separate the stringy pieces from it; pound it in a mortar, working up with it four ounces of fresh butter, and some of the gravy from the meat when baked, seasoned with ground allspice, a little mace and pepper. When the meat has been combined with the butter and gravy, until it is worked into an even paste, put it into jars, and cover it with clarified butter.

If it is purposed to keep it long, cover it with bladder skin. The beef may be potted without in the first instance being salted, but if it is done, it should have salt worked up with it, and be soon eaten after potting. Some persons make their potted beef of meat that has been previously cooked, but the above will be found to be the best receipt.

Beef Steak with Onions.—Prepare a rump steak by pounding it till quite tender; season with salt, pepper, and fresh butter, put in the steak and fry it, when brown on one side turn over, do not let it scorch; when nicely done, take it up, put a little flour over the steak, then add gradually a cup of hot water, seasoned with more salt and pepper if necessary; then put the water over the fire to boil again, and pour over the steak.

Peel two dozen onions, put them on to boil with about two quarts of water, an hour before the steak is put on to fry. When the steak is done,

cut them up, put them in the frying pan, season well with salt, pepper, and butter, sprinkle with flour, stir all well together, place over the fire, stir often to prevent scorching; when they are a little brown and soft, turn them over the steak.

Beef Steak.—The inside of the sirloin makes the best steak; cut about three-quarters of an inch thick, have the gridiron hot, put on the meat and set it over a good fire of coals; turn them often. From eight to ten minutes is the rule for broiling.

Beef Hams.—Prepare, trim, and shape a leg of beef like a ham, then put on a dish, and baste with the following pickle morning and evening, for a month; then remove from the pickle, drain, roll in bran, and smoke it. Cover with a piece of canvas, give it a coat of lime-wash, and hang it in a dry place until wanted. For a piece of meat weighing fourteen pounds mix a pound of salt, the same of coarse brown sugar, an ounce of saltpetre, the same of bay salt, half an ounce of coarse black pepper, and three ounces of treacle, adding sufficient beer to form into a *thick* pickle.

Beef Boiled.—The round is the best boiling piece. Put the meat in the pot, with water enough to cover it; let it boil very slow at first—this is the great secret of making it tender; take off the scum as it rises. From two to three hours, according to size, is the rule for boiling.

Beef Liver.—Liver is very good fried, but the best way to cook it is to broil it ten minutes, with four or five slices of salt pork. Then take it, cut it into small strips, together with the pork; put it in a stew-pan with a little water, butter, and pepper. Stew it four or five minutes.

How to Choose Mutton.—The best is of a fine grain, a bright color, the fat firm and white. It is better for being full grown. The meat of the ewe is not so bright, while the grain is closer. The ram mutton may be known by the redness of the flesh, and the sponginess of the fat.

Roast Leg of Mutton Boned and Stuffed.—The principal skill required in preparing this dish, is the boning; this must be done with a very sharp knife, commencing on the underside of the joint, and passing the knife under the skin until exactly over the bone, then cut down to it, and pass the knife round close to the bone right up to the socket, then remove the large bone of the thickest end of the leg, seeing the meat is clear of the bone; you may then draw out the remaining bones easily. Put in the orifice a highly-seasoned forcemeat, fasten the knuckle end tightly over, replace the bone at the base of the joint, and sew it in; roast it in a cradle spit or on a jack, if the latter, let the knuckle end be downwards, as it is less likely to suffer the forcemeat to drop out. It must be well basted, and should be sent to table with a good gravy.

Leg of Mutton Boiled.—Should be first soaked for an hour and a half in salt and water, care being taken that the water be not too salt, then wiped and boiled in a floured cloth; the time necessary for boiling will depend upon the weight; two hours or two hours and a half should be about the time; it should be served with mashed turnips, potatoes, greens and caper sauce, or brown cucumber, or oyster sauce.

Leg of Mutton Roasted.—Like the haunch and saddle, should be hung before cooking, slowly roasted and served with onion sauce or currant jelly.

Another Method.—Put the leg into an iron saucepan, with enough cold water to cover it, and let it come to a boil gently; or boil it by simmering only; have the spit or jack ready, and take it from the hot water and put it to the fire instantly, it will take from an hour and a half if a large joint.

Breast of Mutton.—May be stewed in gravy until tender; bone it, score it, season well with cayenne, black pepper, and salt; boil it, and while cooking, skim the fat from the gravy in which it has been stewed, slice a few gherkins, and add with a dessertspoonful of mushroom ketchup; boil it, and pour over the mutton when dished.

Breast of Mutton Crumbed or Gratin.—If one breast of mutton, cut off the chine bone down to the gristle; if you have a stock-pot on, put the

breast of mutton into it, let it boil until tender, then take it up to cool; have ready as for the crumbed cutlets, adding to the butter and egg a little chopped mushroom, which strew all over it with a paste brush; then put it on a dish and place it in the oven to brown; the sauce will be under it when dished.

Saddle of Mutton.—This joint like the haunch, gains much of its flavor from hanging for some time; the skin should be taken off, but skewered on again until within rather more than a quarter of an hour of its being done, then let it be taken off, dredge the saddle with flour, and baste well. The kidneys may be removed or remain at pleasure, but the fat which is found within the saddle should be taken away previous to cooking.

Fillet of Mutton.—Choose a very large leg, cut from four to five inches in thickness from the large end, take out the bone, and in its place put a highly savored forcemeat, flour, and roast it for two hours; it may be sent to table with melted butter poured over it, or a rich brown gravy and red currant jelly.

Haunch of Mutton.—The haunch should be hung as long as possible without being tainted; it should be washed with vinegar every day while hanging, and dried thoroughly after each washing; if the weather be muggy, rubbing with sugar will prevent its turning sour; if warm weather, pepper and ground ginger rubbed over it will keep off the flies.

When ready for roasting, paper the fat, and commence some distance from the fire; baste with milk and water first, and then when the fat begins dripping, change the dish, and baste with its own dripping; half an hour previous to its being done, remove the paper from the fat, place it closer to the fire, baste well, and serve with currant jelly.

Haricot Mutton.—In this dish remove the bones, leave the fat on, and cut each cutlet thick; fry them over a quick fire to brown; twelve cutlets will make this dish; put them into a proper sized stewpan with a little good second stock, pepper and salt, a little piece of sugar, cover it over and stew gently over a slow fire; when tender, strain off sufficient stock for the sauce.

Mutton Cutlets.—Loin chops make the best cutlets. Take off the vertebræ or thickest end of each bone, and about an inch off the top of the bone; put the chops into a stewpan in which has been previously melted a little butter seasoned with salt; stew for a short time, but not until they are brown, as that appearance is accomplished in another manner. Chop some parsley very fine, add a little thyme, mix it with sufficient yolk of egg to coat the chops, which will have been suffered to cool before this addition to them; then powder them with bread crumbs, over which a pinch of cayenne pepper has been sprinkled; broil them upon a gridiron over a clear but not a brisk fire, and when they are brown dish them; lemon juice may be squeezed over them, or the dish in which they are served may be garnished with thin slices of lemon in halves and quarters.

Mutton Chops Fried.—The fat in which the chops are to be fried should be boiling when the chops are put into it. They should be pared of fat and well trimmed before cooking, turned frequently, and when nicely browned they will be done; of course if they are very thick, judgment must be exercised respecting the length of time they will occupy in cooking.

Hashed Mutton.—Cut the cold mutton into slices as uniform in size as possible, flour them, pepper and salt them, put them into a stew pan with some gravy made of an onion stewed, with whole pepper and toasted bread, in a pint of water, to which a little walnut ketchup has been added—this gravy should be stewed two hours before using. Do not let the hash boil; when it is done, add a little thickening of butter, flour and water, if required, and serve up with sippets of toasted bread.

To Dress Mutton Hams.—Soak the ham for five or six hours in cold spring water, unless it has only recently been cured, then one hour will suffice; put it into cold water, boil gently; it will be done in two hours and a half. It is eaten cold.

Irish Stew.—Cut a neck of mutton as for the haricot; blanch the chops in water, then put them into another stewpan with four onions cut in slices, put to it a little of your second stock, and let it boil a quarter of an hour; have ready some potatoes pared, put them into the stewpan with the mutton, with salt and pepper. As some like the potatoes whole and some mashed, so as to thicken the stew, you must boil them accordingly; dish the meat round, and the vegetables in the middle.

Leg of Lamb, Roasted.—This joint should be roasted gradually, commencing at a distance from the fire, and gradually placing it nearer; it should be well basted, dished hot, and served with mint sauce.

Leg of Lamb, Forced.—Carefully take out all the meat with a sharp knife, and leave the skin whole with the fat on it; convert the lean which has been cut into a forcemeat, thus: to two pounds of meat add two pounds of beef suet chopped small, and beat it in a marble mortar till it is very fine; take away all the skin off the meat and suet, and mix it with four spoonfuls of grated bread, eight or ten cloves, four or five blades of mace dried and beaten fine, half a nutmeg grated, a little pepper and salt, some lemon-peel cut fine, a small portion of thyme and parsley, and four eggs; mix all together and put it into the skin, so that it may assume its original form: sew it up, roast it, and baste it with butter, and serve with stock cut from the loin and fried in gravy.

To Stew a Brisket of Lamb.—Cut it into pieces, pepper and salt well, and stew in sufficient gravy to cover the meat until tender, then thicken the sauce, and pour in a glass of sherry; serve on a dish of stewed mushrooms.

Lamb's Head.—Wash well a lamb's head and pluck, take out the brains, blanch them by themselves, boil the head and pluck for about a quarter of an hour, take it up to cool, take out the tongue, trim the two halves of the head neatly, and score it, then egg and bread-crumb them as you would cutlets, and brown them in the oven or before the fire. Cut up in small dice in equal quantities the tongue, liver, heart, and lights; fry in a stewpan a little chopped parsley, shallot, and mushroom if you have it, to a nice light brown; dry up the butter with flour, use some good second stock or brown sauce; season with lemon, cayenne pepper, salt, and a dust of sugar, put the eminc*es under the head, the brain, egg, and crumb in four pieces, and put round.

A Leg of Pork Roasted.—The pork should be young and dairy-fed; score the skin with a sharp penknife; a little fresh butter is sometimes rubbed over the skin to make it brown and crisp without blistering. Chop some sage that has been scalded very fine, add to it an onion parboiled, mix some bread crumbs and a small portion of finely-chopped apple; mix altogether, season with pepper and salt, make an incision by separating the skin from the fat in the under and fillet end of the leg, and place the stuffing there; serve up with apple sauce. The time of roasting will depend upon the size of the leg.

A Leg of Pork Boiled.—After having been salted, it should be washed in clean cold water, and scraped thoroughly white and clean preparatory to cooking; it should then be put into a floured cloth, and into cold water on the fire; when the rind is quite tender the pork will be done. Let the water be well skimmed, and serve with such vegetables as are in season. Should the joint be large, allow a quarter of an hour to each pound, with an additional twenty minutes from the time it boils.

Loin of Pork.—Should, like the leg, be scored before roasting, and well jointed, to make the chops separate easily, and then roast as a loin of mutton; or it may be put into enough water to cover it; simmer until it is nearly done, then take it out, strip the skin off, coat it well with yolk of egg and bread crumbs, and roast for about a quarter of an hour or until it is thoroughly done.

Spare Rib.—A spare rib will take two hours and a half to roast, unless very large, and then three hours will be required to cook it thoroughly; while roasting, baste with butter and dredge with flour, pound some sage,

and powder the spare rib with it about twenty minutes before it is done ; a pinch of salt may be added.

Boiled Pork—of all kinds.—The leg you must skin the same as ham, and dish it back part upwards, and glaze it ; place a ruffle at the knuckle ; use for sauce, sauer kraut, or stewed red cabbage ; peas pudding to all pork when boiled.

Pig's Head Boiled.—This is the more profitable dish, though not so pleasant to the palate ; it should first be salted, which is usually done by the pork butcher, it should be boiled gently an hour and a quarter; serve with vegetables.

Pig's Harslet.—Is made with the liver and sweetbreads, which must be well cleaned ; add to them pieces of pork, both fat and lean, chop finely sage and onions, season with pepper and salt, and mix with the preceding; put them in a cowl, tie it closely, and roast. It may also be baked. Serve with a sauce of port wine, water, and mustard, just boiled up, and put into the dish.

To Cure Hams.—Pound some bay salt, saltpetre, common salt, and some coarse sugar, mix it well together, then put it all in to get hot, and while hot, rub the hams well with this, repeating it every morning for a week ; then let them lie in the brine for another week, until all is well incorporated in the meat ; then take them out to drain on dishes, flour them, and hang them up to dry. You must be guided a good deal by the size of the hams.

Keeping Hams for Summer Use.—Slice them and fry rather less than for the table, as fast as a slice is done place it in a stone jar and keep well pounded down until the jar is full, then place a weight on, and, when cold, fill with the fat left from cooking.

Ham Toast.—Melt a small piece of butter in a stewpan until it is slightly browned ; beat up one egg and add it to it ; put in as much finely-minced ham as would cover a round of buttered toast, adding as much gravy as will make it moist when quite hot. When all the ingredients are in, stir them quickly with a fork ; pour on to the buttered toast,which cut in pieces afterwards any shape you please. Serve hot.

To Bake a Ham.—Put the ham in soak previous to dressing it ; if an old one, two hours will be required, but if not very old, an hour will suffice. Wipe it very dry, and cover it with a paste about an inch in thickness. The edges being first moistened, must be drawn together, and made to adhere, or the gravy will escape. Bake it in a regular well-heated oven, it will take from three to six hours, according to its weight.

Pettitoes.—Put them in just sufficient water to cover them, add the heart and liver, boil them ten minutes, then take out the liver and heart, and mince them small, return them to the feet, and stew until quite tender ; thicken with flour and butter, season with pepper and salt, and serve up with sippets of plain or toasted bread ; make a pyramid of the minced heart and liver, and lay the feet round them. When pettitoes are fried, they should first be boiled, then dipped in butter, and fried a light brown.

Sausages.—Chop fresh pork very fine, the lean and fat together, (there should be rather more of the lean than the fat,) season it highly with salt, pepper, sage, and other sweet herbs, if you like them—a little saltpetre tends to preserve them. To tell whether they are seasoned enough, do up a little into a cake, and fry it. If not seasoned enough, add more seasoning, and fill your skins, which should be previously cleaned thoroughly. A little flour mixed in with the meat, tends to prevent the fat from running out when cooked. Sausage-meat is good, done up in small cakes and fried. In summer, when fresh pork cannot be procured, very good sausage-cakes may be made of raw beef, chopped fine with salt pork, and seasoned with pepper and sage. When sausages are fried, they should not be pricked, and they will cook nicer, to have a little fat put in the fryingpan with them. They should be cooked slowly. If you do not like them very fat, take them out of the pan when nearly done, and finish cooking them on a grid-

ron. Bologna sausages are made of equal weight each, of ham, veal, and pork, chopped very fine, seasoned high, and boiled in casings, till tender, then dried.

Sausages, to Fry.—Are best when quite fresh made. Put a bit of butter or dripping into a clean fryingpan; as soon as it is melted (before it gets hot), put in the sausages, and shake the pan for a minute, and keep turning them (be careful not to break or prick them in so doing), fry them over a slow fire till they are nicely browned on all sides; when they are done, lay them on a hair-sieve placed before the fire for a couple of minutes, to drain the fat from them. The secret of frying sausages is to let them get hot very gradually, they then will not burst if they are not stale. You may froth them by rubbing them with cold fresh butter, and lightly dredge them with flour, and put them in a cheese-toaster or Dutch-oven for a minute.

Sausage Meat.—Take 2 lbs. lean meat, 1 lb. fat pork, chop fine, and mix with two tablespoonfuls black pepper, 1 of cloves, 7 of powdered sage, and 5 of salt.

Yorkshire Bacon.—It is generally admitted that the bacon which comes from Yorkshire is the best of this kind of food. The peculiarity of flavor depends upon the mode of curing, which is conducted in the following manner:—After killing, the meat is suffered to hang for twenty-four hours, before being cut up; saltpetre is then rubbed in, in the proportion of one pound to two hundred and eighty pounds of meat, and from twenty-one to twenty-eight pounds of common salt; this being well rubbed in, the meat is laid in a tub kept for that purpose. Having lain for a fortnight, it is turned over, and about seven pounds of salt is applied, after which the meat is left for a fortnight longer; it is then taken out, and hung up in the kitchen, the inside washed over with quicklime and water, to preserve it from the bacon-fly and prevent it turning rancid; it is then hung up in a spare room away from all heat, but where it is perfectly dry.

Bacon and Cabbage.—Boil some streaky bacon in a small quantity of stock, with eight or ten sausages; in the same stock boil some white cabbages for about two hours; add salt and spices, and serve very hot.

Head Cheese.—Boil the head and feet very tender; remove all the bones; put the meat into a strainer and press all the grease out that is possible; when cool chop fine: season with pepper and salt, and pack the same as sausage meat.

Calf's Liver and Heart.—Are good, broiled or fried. Some people like the liver stuffed and baked.

Tripe.—After being scoured, should be soaked in salt and water seven or eight days, changing the water every other day, then boil it till tender, which will take eight or ten hours. It is then fit for broiling, frying, or pickling. It is pickled in the same manner as souse.

Pork Chops.—Cut the chops about a third of an inch thick, trim them neatly and beat them flat. Put a piece of butter into the fryingpan, and as soon as it is hot, lay in the chops, turn them frequently, and they will be well browned in a quarter of an hour. Take one upon a plate and try it; if done, season it with a little finely-minced onion, powdered sage, pepper and salt. Or prepare some sweet herbs, sage and onion chopped fine, and put all into a stewpan with a bit of butter. Give them one fry, beat two eggs on a plate with a little salt, and the minced herbs, and mix it all thoroughly together. Dip the chops in, one at a time, then cover them with bread crumbs and fry them in hot lard or dripping, till they are of a light brown.

Pork Steaks.—Cut the steaks from a loin or neck, and of middling thickness; pepper and broil them, and keep them turning. When nearly done, sprinkle them with salt, rub a little butter over them, and serve immediately they are taken off the fire, a few at a time.

Pig Roast.—The young of the animal, known as the sucking pig, is made choice of for this dish. The hair of the animal should be removed by scalding. When this is done, remove the entrails, thoroughly clean the nos-

trils and ears, and wash the whole body in cold water. Cut off the feet at the first joint, loosening the skin, and leaving it on to turn neatly over. The pig must then be stuffed as follows: Take half an ounce of mild sage, and two young onions parboiled; chop these very fine, add a cupful of grated bread crumbs, a quarter of a pound of good butter, and a high seasoning of cayenne pepper, and salt. Sew the slit neatly up, set it down to roast before a brisk clear fire, and baste first with brine, then with the fresh butter or salad oil; when the crackling is thoroughly browned and crisp, the pig will be sufficiently done. A pig iron, or some ingenious substitute, must be placed in the centre of the grate, part of the time, to prevent the middle regions of the animal from being scorched before the extremities are done. Serve with a sauce of clear beef or veal gravy, with a squeeze of lemon, and, if approved, a little of the stuffing stirred in the same tureen.

Souse.—Take pig's ears and feet, clean them thoroughly, then soak them in salt and water for several days. Boil them tender and split them, they are then good fried. If you wish to souse them when cold, turn boiling vinegar on them, spiced with pepper-corns, and mace. Cloves improve the taste, but it turns them a dark color. Add a little salt. They will keep good pickled five or six weeks. Fry them in lard.

Veal.—The loin of veal is the best piece for roasting. The breast and rack are good roasted. The breast also is good made into a pot pie, and the rack cut into small pieces and broiled. The leg is nice for frying, and when several slices have been cut off for cutlets, the remainder is nice boiled with a small piece of salt pork. Veal for roasting should be salted, peppered, and a little butter rubbed on it, and basted frequently. Put a little water in the dripping pan, and unless the meat is quite fat, a little butter should be put in. The fillet is good baked; the bone should be cut out, and the place filled with a dressing made of bread soaked soft in cold water, a little salt, pepper, a couple of eggs, and a tablespoonful of butter put in—then sew it up, put it in your bake pan, with about a pint of water, cover the top of the meat with some of the dressing. When baked sufficiently, take it up, thicken the gravy with a little flour and water well mixed, put in a small piece of butter, and a little wine and catsup, if you like the gravy rich.

Breast of Veal—Forced.—After taking out the tendons and all the rib bones, flatten and trim the veal; spread it all over with forcemeat, and sprinkle over it, if you have got it, a little chopped truffle or mushrooms, and a little pepper and salt: then roll it tightly up and tie it; after which put it into a cloth and stew it for several hours, then take it up, and take off the cloth and strings, dry it and glaze it, and put some good sauce.

Shoulder of Veal.—Remove the knuckle, and roast what remains, as the fillet; it may or may not be stuffed; if not stuffed, serve with oyster or mushroom sauce; if stuffed, with melted butter.

Shoulder of Veal Boned and Stewed.—Bone the shoulder, and lay in the orifice a veal forcemeat; roll and bind the shoulder; roast it an hour, then put it into a stewpan with good white or brown gravy, and stew four or five hours, regulating the time to the size of the joint; when it is done, strain the gravy to clear it of fat, and serve with forcemeat balls.

Loin of Veal.—Divide the loin, roast the kidney, and place under the fat a toast, and serve swimming in melted butter. The chump end must be stuffed with the same stuffing as the fillet, and served with the same sauce; those who object to putting the stuffing in the joint, may send it to table with balls of stuffing in the dish.

Loin of Veal Boiled.—Take a loin of about eight pounds, skewer down the flap without disturbing the kidney, put the loin in the kettle with enough cold water to cover it, let it come gradually to a boil (it cannot boil too slowly), continue for two hours and a quarter, but it must boil; remove the scum as it rises, send it to the table in béchamel or with parsley and melted butter.

To hash Calf's Head.—If this dish is to be made of the remains of a head already cooked, there is no necessity to reboil it before it is placed in the stewpan with the other ingredients; if it is to be made with one as yet uncooked, soak it thoroughly for two hours, parboil it, cut the meat in slices about one inch thick and three inches long, or smaller if preferred; brown an onion sliced in flour and butter in a stew saucepan, add to the meat as much rich gravy as the quantity of meat will permit, season with pepper, salt, and cayenne; let it boil, then skim clean, and simmer until the meat is quite tender; a few minutes before serving throw in parsley in fine shreds and some finely chopped sweet herbs; squeeze a little lemon in, and garnish with forcemeat balls, or thin slices of broiled ham rolled. If expense is not an object you may add morels and truffles in the browning.

Plaw.—Boil a piece of lean veal tender. Take it up, cut it into strips three or four inches long, put it back into the pot, with the liquor it was boiled in, with a teacup of rice to three pounds of veal. Put in a piece of butter the size of a hen's egg; season it with salt, pepper, and sweet herbs if you like; stew it gently till the rice is tender, and the water nearly stewed away. A little curry powder in this converts it into a curry dish.

A Veal Stew.—Cut four pounds of veal into strips three inches long and one inch thick; peel twelve large potatoes, and cut them into slices one inch thick; spread a layer of veal on the bottom of the pot, sprinkle in a little salt and pepper, then a layer of potatoes, then a layer of veal seasoned as before. Use up the veal thus; over the last layer of veal put a layer of slices of salt pork, and over the whole a layer of potatoes. Pour in water till it rises an inch over the whole; cover it close, heat it fifteen minutes, and simmer it an hour.

Calf's Head Baked.—Butter the head, and powder it with seasoning composed of very fine bread crumbs, a few sweet herbs and sage, chopped very fine, and cayenne, white pepper and salt. Divide the brains into several pieces, not too small, sprinkle them with bread crumbs, and lay them in the dish with the head. Strew a quantity of small pieces of butter over the head and in the eyes, throw crumbs over all, pour in three parts of the dish full of water, and bake in a fast oven two hours.

Calf's Head for Grill.—When the head is boiled sufficiently, draw out all the bones, and put it to cool, and then cut it (if not required whole) into square long pieces; egg and bread-crumb them as you would cutlets, only add some chopped sweet herbs, as well as parsley; put it in your oven to brown.

Calf's Head.—Let the head be thoroughly cleaned, the brain and tongue be taken out, and boil it in a cloth to keep it white (it is well to soak the head two or three hours previously to boiling, it helps to improve the color); wash, soak, and blanch the brains, then boil them, scald some sage, chop it fine, add pepper and salt, and a little milk, mix it with the brains; the tongue, which should be soaked in salt and water for twenty-four hours, should be boiled, peeled and served on a separate dish. The head should boil until tender, and if intended to be sent plainly to the table should be served as taken up, with melted butter and parsley; if otherwise, when the head is boiled sufficiently tender, take it up, spread over a coat of the yolk of egg well beaten up, powder with bread crumbs, and brown before the fire in a Dutch or American oven.

Neck of Veal Braised.—This is done much in the same manner as the neck of veal stewed: it is larded with bacon, rolled in chopped parsley, pepper, salt, and nutmeg, placed with the scrag in a tosser, in which place lean bacon, celery, carrots, one onion, a glass of sherry, or Madeira, with sufficient water to cover it all; stew over a quick fire until it is sufficiently tender, remove the veal, and strain the gravy, place the veal in a stewpan, in which some butter and flour has been browned, letting the bones be uppermost; when the veal is nicely colored it is enough; boil as much of the liquor as may be required, skim it clear, squeeze a lemon into it, pour it over the meat, and serve.

Veal Cutlets.—The cutlet should be cut as handsomely as possible, and about three-quarters of an inch in thickness; before cooking, they should be well beaten with the blade of a chopper, if a proper beater be not at hand; then fry them a light brown, and send them up to table garnished with parsley, and rolls of thin-sliced, nicely fried bacon; they are with advantage coated, previous to cooking, with the yolk of an egg, and dredged with bread crumbs.

Another Way.—Procure your cutlets cut as in last receipt, coat them with the yolk of eggs well beaten, powdered bread crumbs, sweet herbs, grated lemon peel, and nutmeg; put some fresh butter in the pan, and when boiling, put in your cutlets; now make some good gravy; when the cutlets are cooked, take them out, and keep them before the fire to keep hot, dredge into the pan a little flour, put in a piece of butter, a little white stock, juice of lemon to taste, season with pepper and salt, adding mushroom ketchup, boil quickly until a light brown, then pour it over the cutlets, and serve, the cutlets being laid in a circle round the dish, and the gravy in the centre.

Calf's Liver.—Lay the liver in vinegar for twelve hours, it will render it firm; then dip it in cold spring water and wipe it dry, cut it in even slices, sprinkle sweet herbs, crumbled finely, over it, and add pepper and salt, dredge with flour, and fry in boiling lard or butter, the last is preferable; remove the liver when fried a nice brown, pour away a portion of the fat, and pour in a cupful of water with a lump of butter well rolled in flour, in which a spoonful of vinegar and cayenne or lemon juice has been stirred, boil it up, keeping it stirred all the while, and serve the liver up in it; thin slices of hot fried bacon should be sent to table with it.

Collops.—Cut part of a leg of veal into pieces, three or four inches broad—sprinkle flour on them, fry them in butter until brown, then turn in water enough to cover the veal. When it boils, take off the scum, put in two or three onions, a blade of mace, a little salt and pepper. When stewed tender, take up the meat, thicken the gravy with flour and water, mixed smoothly together, squeeze in the juice of half a lemon, then turn it over the collops. Garnish them with a lemon cut in thin slices.

Sweetbreads.—Should be soaked in water, put for eight or ten minutes in boiling water, and then into clear cold spring water, to blanch. They may be cut in slices, or in dice, and put into fricassées of meat or ragouts, or they may be served as a separate dish.

Sweetbreads as Cutlets.—If you cannot get heart sweetbreads, you must use the throat. Blanch them for about ten minutes, then put them to cool in cold water; then take them out and dry them in a cloth, cut longways twelve or fourteen pieces for cutlets, making them a nice shape; if you wish for them to be white sauté cutlets, you must put some butter or lard in your cutlet-pan, juice of a lemon, a little white pepper, and salt; do not color them, but take them up and lay them upon white paper to soak up the grease from them; dish them round upon a tureen, and pour the sauce upon the middle of them.

Force Meat Balls.—Chop a pound or two of veal fine—mix it with one or two eggs, a little butter, or raw pork chopped fine—season it with salt and pepper, or curry powder. Do them up into balls about the size of half an egg, and fry them brown.

Sweetbreads, with Tomatoes.—Take four large sweetbreads, put them into scalding water; after remaining five minutes take them out and put them into cold water; skin but do not break them, put them into a stewpan with water, season with pepper and salt, place them over a slow fire, mix one large spoonful of flour with a good large piece of butter, stir the butter and gravy well together. After leaving a half hour take up and pour the gravy into a pint of stewed tomatoes; thicken with flour to taste; season with salt and pepper; then strain through a small wire sieve into the stewpan; let it boil a few minutes; then pour it out over the sweetbreads. Send to table hot.

Sweetbreads, French Style.—Take three dozen sweetbreads, put them into hot water and let them boil ten or twelve minutes; when cold skin but do not break them; take six eggs and beat them well; season well with pepper and salt; roll in bread crumbs; fry them in salt pork to a nice brown. Serve hot with butter and parsley sauce.

Fritters of Cold Meat, &c.—Besides cold meat, fritters may be made of almost anything; such as cheese, cold macaroni, rice, game, fish, vegetables, poultry, hard-boiled eggs, &c. The cold meat, fish, or fowl, may be merely minced, or else pounded to a paste in a mortar, or flaked—*i. e.*, pulled asunder in shreds with two forks. Season nicely and mix with batter in the proportion of equal parts of batter and meat. Make hot in a frying-pan some fresh lard; place in it spoonfuls of the mixture; fry beautifully brown; drain the fritters and serve them on a damask cloth, or on a dish strewn over with powdered salt, and decorated with crisp parsley. A very small quantity of potted meat, tongue, ham, or preserved fish, &c., will thus make a pretty dish to eke out a scanty dinner. Mixed mustard or scraped horse-radish may be sent to table with fritters of beef, essence of shrimp or anchovy with fish, preserved tomato with pork, pickles with mutton, lemon with poultry, &c.

Game Hash.—Take underdressed or half-roasted game, and after having stripped the skin from the thighs, wings, and breast, arrange the joints evenly in a clean stewpan, and keep them covered till wanted. Cut into cubes four ounces of the lean of an unboiled ham, and put it, with two ounces of butter, into a thick well-turned saucepan or stewpan, add three or four shallots minced, a carrot sliced, four cloves, two bay-leaves, a dozen peppercorns, one blade of mace, a small sprig of thyme, and two or three of parsley. Stew them over a gentle fire, stirring them frequently, until the sides of the saucepan appear of a reddish brown, then mix well with them a dessertspoonful of flour, and let it take a little color. Next, add by degrees, making the sauce boil as each portion is thrown in, three-quarters of a pint of strong veal stock or gravy, and half a pint of sherry or Madeira; put in the bodies of the birds, well bruised, and boil them for from an hour to an hour and a half; strain, and clear the sauce from fat; pour it on the joints of game, heat them in it slowly; and when they are near the point of boiling, dish them immediately with sippets of toast arranged round the dish.

Turkish Hash.—Cut the cold roast meat into small round pieces; make some cream hot in a stewpan; put in the meat; add a teacupful of infusion of saffron: season with salt and cayenne pepper. When the whole is thoroughly hot, serve with a rim of boiled rice round the dish, decorated here and there with small pickled capsicums.

To Fry Meat in Batter—Make a batter with beaten eggs, milk, flour, salt and pepper; dip your pieces of cold meat in this, and fry quickly in plenty of hot lard or friture. The meat should not be cut too thin. When properly brown drain it from the fat, and either serve upon a folded napkin or in a dish decorated with parsley fried green and crisp.

Rechauffe aux Tomates.—Either simply toss in butter your sliced cold meat, and send it to table arranged in a dish of dressed tomatoes, or warm the meat in a small quantity of rich savory gravy, and thicken with tomato pulp; serve meat and tomatoes together.

Cold Meat Served a la Bretonne.—Have in readiness some blanched white haricot beans; fry enough onions in butter; when quite done add a little vinegar, loaf sugar, and preserved tomatoes; reduce the whole till very thick; moisten with good gravy; add your haricot beans and a good piece of fresh butter; in this sauce make hot your pieces of cold meat, which you have first trimmed of an equal size. Serve the meat upon the sauce.

Cold Meat Sanders.—Mince any kind of cold meat; season well with pepper, salt, and shred onions; place a little of the mixture in small buttered moulds; fill them up with potatoes mashed and mixed with cream; lay a piece of butter on the top of each and bake in an oven until the tops are browned.

Meat Warmed up au Gratin.—Well butter a dish; sprinkle it with rasped toast; lay in it cold meat nicely sliced; season well with salt, pepper, nutmeg, and minced mushrooms; strew more rasped toast on the top; add a small teacupful each of white wine and good gravy, and quickly make the whole hot in a brisk oven.

Meat Fried with Eggs.—Cut the meat into pieces rather larger than a fried egg would be: soak it in a marinade of lemon-juice, bruised shallot, and herbs; at the end of an hour drain it, egg and bread-crumb it, and fry quickly in plenty of friture until beautifully browned; fry the same number of eggs as you have pieces of meat, nicely trim them, and serve an egg upon each bit of meat, arranged *en couronne* round the inner rim of a dish; pour a gravy or clear sauce in the middle, and send to table very hot.

Game, &c., Warmed up in Orange Sauce.—Be provided with sufficient strong beef-gravy; reduce to almost a glaze; place in it your meat cut into long and rather thin slips, add the juice of two oranges, and when the whole is quite hot place the ragout in a dish, and strew upon it the orange-rind which you have pared off as thin as possible and cut up small. Meat for dishes of this description should be either very much *under* or *over* done, as in the first case the meat will answer as well as if it had been employed before being dressed; and in the second it will be as lusciously tender and glutinous as bouillée when it is re-warmed in the form of a made dish.

Cold Meat Warmed up with Celery.—Boil some sliced celery in broth nicely seasoned; when tender, put in your meat which you have cut thin, and thicken with a good bit of fresh butter rubbed into a small quantity of flour; garnish with sliced lemon.

Chicken and Veal Pot Pie.—If the pie is to be made of chickens, joint them—boil the meat until about half done. Take the meat out of the liquor in which it was boiled, and put it in a pot, with a layer of crust to each layer of meat, having a layer of crust on the top. The meat should be seasoned with salt and pepper—cover the whole with the boiled meat liquor. If you wish to have the crust brown, keep the pot covered with a heated bake pan lid. Keep a tea kettle of boiling water to turn in as the water boils away—cold water makes the crust heavy. The crust for the pie is good like that made for fruit pies, with less shortening, but raised pie crust is generally preferred to any other. It is made in the following manner—mix together three pints of flour, a teacup of melted butter, a teaspoonful of salt, then turn in half a teacup of yeast—add cold water to make it sufficiently stiff to roll out. Set it in a warm place to rise, which will take seven or eight hours.

Beef and Mutton Pie.—Take tender meat, pound it out thin, and broil it ten minutes—then cut off the bony and gristly parts, season it highly with salt and pepper, butter it, and cut it into small pieces. Line a pudding dish with pastry, put in the meat, and to each layer add a teaspoonful of tomato catsup, together with a tablespoonful of water—sprinkle over flour, and cover it with pie crust, and ornament as you please with pastry. Cold roast, or boiled beef and mutton, make a good pie, by cutting them into bits, and seasoning them highly with salt and pepper. Put them into a pie dish, turn a little melted butter over them, or gravy, and pour in water till you can just see it at the top.

Beef Steak Pie.—Take some good steaks, beat them with a rolling pin, season them with pepper and salt; fill a dish with them, adding as much water as will half fill it, then cover it with a good crust, and bake it well.

Cold Veal or Chicken Pie.—Lay a crust into a shallow tart dish, and fill it with the following mixture: shred cold veal or fowl, and half the quantity of ham, mostly lean, put to it a little cream, season with white and cayenne pepper, salt, a little nutmeg, and a small piece of shallot chopped as fine as possible: cover with crust, and turn it out of the dish when baked, or bake the crust with a piece of bread to keep it hollow, and warm the mince with a little cream, and pour in.

Mutton Pie.—Cut steaks from a neck or loin of mutton that has hung,

beat them, and remove some of the fat, season with salt and pepper, and a little onion; put a little water at the bottom of the dish and a little paste on the edge, then cover with a moderately thick paste, or raise small pies, and break each bone in two to shorten it, season and cover it over, pinching the edge. When they come out of the oven, pour into each a little second stock.

Chicken Pie.—Take one pair good young chickens, cut in small pieces, season with pepper and salt and small strips of salt pork, put in saucepan with water to cover it, boil for half an hour, add flour and butter to thicken the gravy, have ready a large dish, served with paste, put all in the dish covered with a good rich paste. Bake for half an hour.

Chicken Pie.—Boil two chickens tender; season with butter, pepper and salt; thicken the gravy a very little with flour; make the dough as for short biscuit, and roll it out as thick as your hand, large enough to line a small tin pan; dip in the chicken and a part of the gravy; put on a top crust and pinch it down well; make an opening on the top, with a knife, an inch or two long, and prick it with a fork. Veal and beef answer every purpose for this kind of pie. The gravy left in the pot take to the table in a gravy dish.

Veal Pot Pie.—Take two pounds of best of veal, cut in small pieces, half pound of salt pork, sliced thin, four quarts of cold water; pepper and salt all, put on the fire; after boiling for one hour have three pounds of light bread dough, pick small pieces, say one ounce pieces, put in saucepan with the veal and pork and let it boil for twenty minutes. Serve as soon as taken from the fire.

Pork Apple Pie.—Make your crust in the usual manner; spread it over a large deep plate; cut some slices of fat pork very thin, also some slices of apple; place a layer of apples, and then of pork, with a very little allspice and pepper, and sugar between,—three or four layers of each, with crust over the top. Bake one hour.

Veal Pie.—Cut your veal up in small pieces; boil it an hour; season it with salt and pepper, and a small piece of butter; mix your flour with sour milk, saleratus, and a small piece of lard, and mould it for the crust; line the sides of a tin dish or basin with the crust; put the meat in, and fill up the basin with the gravy as full as you can handle it; shake some flour in it, and cover it over with the crust, leaving a hole in the centre for a vent. Bake from one and a half to two hours. If preferred, cream-tartar crust may be used.

Meat Pie.—Of whatever kind, let the pieces of meat be first fried brown over a quick fire, in a little fat or butter, and seasoned with pepper and salt; put these into a pie-dish with chopped onions, a few slices of half-cooked potatoes, and enough water just to cover the meat. Cover the dish with crust, made with two pounds of flour and six ounces of butter, or lard, or fat dripping, and just enough water to knead it into a stiff kind of dough or paste, and then bake it for about an hour and a half.

Rice Chicken Pie.—Cover the bottom of a pudding dish with slices of broiled ham; cut up a broiled chicken and nearly fill the dish; pour in gravy or melted butter to fill the dish; add chopped onions if you like, or a little curry-powder, which is better; then add boiled rice to fill all interstices and to cover the top thick. Bake it for one-half or three-quarters of an hour.

Fish Pie.—One small codfish cut up in small pieces, five slices of nice fat pork. Fry the pork; boil about one and a half dozen potatoes, and mash them fine, and season with pepper, salt and butter. Fill the dish with a layer of fish and a layer of pork alternately, then put in water enough to half fill the dish; take the potatoes and spread over the top, leaving a space in the middle for the air to escape. Bake a little more than an hour.

Game Pie.—If the birds are small, keep them whole; if large, divide or quarter them. Season them highly, and put plenty of butter into the dish above and below them, or put a beef-steak into the bottom of the dish; cover it with good puff paste, and take care not to bake the pie too much; a half pint of hot sauce made of melted butter, the juice of a lemon, and a glass of claret, poured into the dish when to be served hot is

a great improvement. A very savory raised game pie is made of partridges, pheasants, and other kinds of game mixed, taking out the bones, and cutting up the flesh; it is then mixed with chopped liver, and placed underneath the raised crust; after which, when cold, the top is taken off, and a strong jelly, made from the bones, and well spiced, then, after getting cold, mixed among the meat.

Stuffed and Baked Fish.—Soak bread in cold water till soft—drain off the water, mash the bread fine, mix it with a tablespoonful of melted butter, a little pepper and salt—a couple of raw eggs makes the dressing cut smoother—add spices if you like. Fill the fish with the dressing, sew it up, put a tea cup of water in your bake pan, and a small piece of butter—lay in the fish, bake it from forty to fifty minutes. Fresh cod, bass, and shad, are suitable fish for baking.

Fish Baked.—Some kinds of fish are better baked than boiled, especially that class that furnishes the smallest amount of nutrition; as the process of baking tends to the retention of the nutritive qualities of food while it is being dressed. In baking fish, generally, the oven employed should be of a very moderate heat; the time is not of so much consequence as the temperature, so much so that fish may be left in a slow oven for hours without injury.

Trout.—Trout are good boiled, broiled, or fried—they are also good stewed a few minutes, with bits of salt pork, butter, and a little water. Trout, as well as all other kinds of fresh water fish, are apt to have an earthy taste—to remove it, soak them in salt and water a few minutes after they are cleaned.

To Bake a Shad, Rock-Fish, or Bass.—Clean the fish carefully, sprinkle it lightly with salt and let it lie a few minutes; then wash it, season it slightly with cayenne pepper and salt, and fry it gently a light brown. Prepare a seasoning of bread crumbs, pounded mace and cloves, marjoram, parsley, cayenne pepper and salt; stew it over and in the fish; let it stand an hour. Put it in a deep dish, and set it in the oven to bake; to a large fish, put in the dish half pint of water, one pint of wine, Port and Madeira mixed, half teacupfuls of mushrooms or tomato ketchup; to a small one allow in proportion the same ingredients; baste frequently, and garnish with sliced lemon.

Chowder.—Fry three or four slices of pork till brown—cut each of your fish into five or six slices, flour, and put a layer of them in your pork fat, sprinkle on pepper and a little salt—add cloves, mace, and sliced onions if you like—lay on several bits of your fried pork, and crackers previously soaked soft in cold water. This process repeat till you get in all the fish, then turn on water enough to just cover them. Put on a heated bake pan lid. When the fish have stewed about twenty minutes, take them up, and mix a couple of teaspoonfuls of flour with a little water, and stir it into the gravy, also, a little butter and pepper. Half a pint of white wine, spices, and catsup, will improve it. Bass and cod make the best chowder—black fish and clams make tolerably good ones. The hard part of the clams should be cut off, and thrown away.

Baked Cod.—Cut a large fine piece out of the middle of the fish, and skin it carefully; stuff it with a stuffing composed of the yolks of two eggs boiled hard, the roe half-boiled, bread crumbs, grated lemon-peel, butter, pepper, and salt to taste. Bind it with the undressed white of an egg, and sew in the stuffing with white thread, bake it in a Dutch oven before the fire, turn it frequently, and baste it with butter; serve with shrimp sauce, plain butter, or oyster sauce. A tin baking-dish is preferable to any other for cooking this fish.

Cod Scalloped.—Take enough cold dressed cod to nearly fill all the shells you purpose using, pound it, beat up the yolk of an egg and pour over it, add a few shrimps skinned, salt, pepper, and a little butter; do not quite fill the shells, strew over them fine bread crumbs, and drop butter in a liquid state over them. Brown them before the fire in a Dutch oven.

Tail of a Cod.—Boil as previously directed and when sufficiently done, that the meat may be easily removed from the bones, divide it into moderate sized pieces, and in a light batter fry them brown. Send up crisped parsley with it as a garnish.

It is sometimes cooked plainly with oyster sauce.

Cod's Head.—Secure it well with strong string, not too thick; put it into a fish-kettle, cover it with water, and put in a small handful of salt, a wineglassful of vinegar, and a quantity of scraped horseradish. Place the fish upon a drainer, and when the water boils, put it into the kettle. Boil gently; when the fish rises to the surface, it is enough; drain it, and be very particular in sliding the fish into the fish-plate that it is not broken. Garnish with scraped horseradish and lemon. Serve with shrimp and oyster sauce.

Cod Fish Pie.—Take a piece from the middle of a good sized fish, salt it well all night, then wash it, and season with salt, pepper, and a few grains of nutmeg, a little chopped parsley and some oysters, put all in your dish, with pieces of butter on the fish; add a cup of good second white stock and cream; cover it with a good crust, adding a little lemon juice in the gravy.

Curry of Cod.—This a firm fish if good; when cold, you can separate the flakes, and proceed as before, adding two dozen of large oysters to your fish.

Salt Cod.—There are a variety of opinions upon the method of dressing this dish, many laboring so hard with soaking and brushing, to produce tenderness, and accomplishing that one end at the expense of the flavor. It is doubtless an essential point to remove the dry unwholesome hardness of the fish, but it is equally essential to retain the flavor, and experience has taught the author that the following process is the most successful of any he has hitherto attempted :—

Soak the fish for eight hours in clean cold water (not spring water,) let the water have enough vinegar in it to impregnate it with a slight flavor and no more; after soaking the above time, take it out and let it drain three or four hours, then put it in soak again for four hours; when this has been done, place it in a fish-kettle with plenty of cold soft water, let it come to a boil very slowly, place it on the side of the fire, and it will cook gradually until enough. Serve with parsnips and egg sauce.

Fresh Herrings Boiled.—Clean them, wash them over with vinegar, fasten the heads to the tails, and put them in boiling water; they will take from ten to twelve minutes. Garnish with parsley, and serve melted butter, in which a tablespoonful of ketchup, a teaspoonful of Chili vinegar and one of made mustard has been mixed while making.

Fresh Herrings Broiled.—To broil them, steep them first in vinegar and water into which a handful of salt has been thrown; let them remain ten minutes, then take them out and broil them over a clear fire (the bars of the gridiron should be rubbed with suet, to prevent the skin of the fish adhering to it.) Serve, garnished with parsley. They may be eaten with melted butter, with a little mustard and vinegar in it, or lemon juice instead of the latter, being preferable.

Fresh Herrings Fried.—Slice small onions, and lay in the pan with the fish, or fry separately, as judgment may dictate; serve the fish with the onions laid round them. The herrings are generally fried without the onions, but those who are partial to this strongly-flavored vegetable will prefer the addition.

To Pot Herrings.—Take from one to two dozen herrings, according to the number you purpose potting; choose them as large, fine, and fresh as you can. Take two ounces of salt, one of saltpetre, two of allspice, reduce them to an impalpable powder, and rub them well into the herrings; let them remain with the spice upon them eight hours to drain, wipe off the spice clean, and lay them on a pan on which the butter has been rubbed; season with nutmeg, mace, pepper, salt, and one clove in powder, one ounce each, save the last; lay in two or three bay leaves, cover with butter and bake gently three hours. When cool, drain off the liquor, pack the fish in

the pots intended for their use ; cover to the depth of half an inch with clarified butter, sufficiently melted just to run, but do not permit it to be hot; they will be ready for eating in two days.

Pike, to boil.---Wash and clean the fish thoroughly ; unless you are very particular in this, you will not conquer an earthy taste, which, from a want of the proper application of the cook's art, too often appears. It is usual to stuff it with forcemeat, more for the purpose of destroying that peculiarity than from any additional flavor or zest it gives the fish. Having cleaned well and stuffed with forcemeat, skewer the head to the tail, lay it upon a drainer and put it in the fish-kettle, let it have plenty of water, into which you may throw a handful of salt and a glassful of vinegar ; when it boils, remove the scum as fast as it rises ; it will take three quarters of an hour dressing, if a tolerable size ; if very large, an hour ; if small, half an hour ; serve with melted butter and lemon sliced or whole. Anchovy sauce may be eaten with the fish. It is always the best method, where a variety of fancies exist, to send the sauce-cruets to table, and permit every one to gratify his peculiar taste.

Smelts Fried.—Scrape the fish clean, cut off the tails and fins, clean and wash them, then replace the livers ; slit them down the sides, flour and fry them of a pale brown color ; drain them and sprinkle salt over them ; serve them on a napkin.

Smelts Potted.—Draw out the insides of the fish, season with salt and pounded mace and pepper, lay them in a pan with butter on the top, bake them ; when nearly cold, take them out, lay them upon a cloth ; put them into pots, clear off the butter from the gravy, clarify, and pour it over them.

New England Chowder.—Have a good haddock, cod, or any other solid fish ; cut it in pieces three inches square ; put a pound of fat salt pork in strips into the pot, set it on hot coals and fry out the oil ; take out the pork and put in a layer of fish, over that a layer of onions in slices, then a layer of fish, with slips of fat salt pork, and then another layer of onions, and so on alternately until your fish is consumed ; mix some flour with as much water as will fill the pot ; season with black pepper, and suit to your taste, and boil it for half an hour. Have ready some crackers (Philadelphia pilot bread, if you can get it), soaked in water till they are a little softened ; throw them into your chowder five minutes before you take it up. Serve in a tureen.

Halibut Stewed.—Put in a stewpan half a pint of fish broth, a tablespoonful of vinegar, and one of mushroom ketchup ; add an anchovy, two good sized onions cut in quarters, a bunch of sweet herbs, and one clove of garlic, also add a pint and a half of water, and let it stew an hour and a quarter, then strain it off clear, and put into it the head and shoulders of a fine halibut and stew until tender ; thicken with butter and flour, and serve.

Herrings Baked.—Take off the heads of the fish ; remove the entrails ; wash and dry them with a cloth ; sprinkle them with a seasoning of black pepper, cloves, and salt mixed ; tie paper over them ; put them in a pan with a few bay leaves, and bake in a moderate oven. They may be eaten either hot or cold, and will keep for many months.

Sturgeon Broiled.—Cut a fine piece of the fish, and skinning it, divide it into slices. Beat up three eggs, and dip each of the slices into them; powder fine bread crumbs mixed with finely-chopped parsley, pepper and salt over them, fold them in paper, and broil them, being careful that the fire is clear. Send them to table with essence of anchovies and soy, accompanied by cold butter.

Before You Bake Sturgeon.—Let it lie several hours in salt and water; then boil it until the bones can be removed ; pour vinegar over your fish and in the water and salt. When done, take it out to cool, then egg and bread-crumb it, then sprinkle clarified butter over it, place it in a moderate hot oven to brown ; make a very thick sauce from your kidneys and good

stock, with a tablespoonful of essence of anchovies, season it with cayenne pepper, salt, dust of sugar, juice of lemon, and a glass of wine.

Trout.—Scale, gut, clean, dry and flour, then fry them in butter until they are rich clear brown; fry some green parsley crisp, and make some plain melted butter, put in one teaspoonful of essence of anchovy, and one glass of white wine; garnish when the trouts are dished, with the crisp parsley and lemon cut in slices; the butter may be poured over the fish, but it is most advisable to send it in a butter tureen.

Trout Stewed.—This is a pleasing and delicate dish when nicely stewed. It is dressed very much in the fashion of other small fish stewed, only that it requires perhaps more care in the different processes. First wash and clean the fish, wipe it perfectly dry, put into a stewpan two ounces of butter, dredge in flour as it melts, and add grated nutmeg, a little mace, and a little cayenne. Stew well, and when fluid and thoroughly mixed, lay in the fish, which having suffered to slightly brown, cover with a pint of veal gravy; throw in a little salt, a small faggot of parsley, and a few rings of lemon peel; stew slowly forty minutes, then take out the fish, strain the gravy clear, and pour it over the fish.

Halibut's Head.—Put a pint of wine, a few anchovies, an onion stuck with cloves, a bunch of sweet herbs, and some pepper, into a stewpan; fill it nearly with water, and stew it for an hour; then strain it, and put in the head of a halibut, stew it till tender; when done enough, thicken the gravy with butter and flour, add a little fish-sauce, and serve it up with forcemeat-balls made of a part of the fish, pounded, and rolled up with crumbs of bread, thyme, marjoram, and nutmeg, bound together with the yolk of an egg. If the fish has been stewed in plain water, a glass of wine should then be added to the sauce.

To Boil Perch.—First wipe or wash off the slime, then scrape off the scales, which adhere rather tenaciously to this fish; empty and clean the insides perfectly, take out the gills, cut off the fins, and lay the perch into equal parts of cold and of boiling water, salted as for mackerel; from eight to ten minutes will boil them unless they are very large. Dish them on a napkin, garnish them with curled parsley, and serve melted butter with them.

To Bake Smelts.—Prepare as above, also strew forcemeat over them, bread crumbs, and moisten with clarified butter; mix, in addition to the gravy, a glass of Madeira, with a dash of anchovies; This must be added before the smelts are laid in. They will be done in ten minutes.

Boiled Eel.—Choose the smallest, simmer in a small quantity of water, into which a quantity of parsley has been put. Garnish and serve with same sauce as the last.

Eels Bread-Crumbed.—Cut your fish the size as before, dry and flour them, and proceed as for other fried fish, dishing them on a napkin with fried parsley.

Eels Fried.—Clean and skin the eels, cut off their heads, and divide them into pieces three or four inches long, and then score across in two or three places; season them with pepper and salt, and dust them in flour, or dip them into an egg beaten up, and sprinkle them with finely-grated bread crumbs; fry them in fresh lard or dripping; let them drain and dry on the back of a sieve before the fire; serve with melted butter and parsley.

Eels Pickled.—Skin some eels, slit them up the middle, take out the bones, and rub the flesh over with salt; let them lie three days, and turn them every day; then take them out of the brine, wash them in water, and wipe them dry with a cloth; season them with nutmeg, cloves, mace, and a bay leaf; roll them up, and tie them tightly in a cloth; boil them in an equal quantity of white wine and vinegar; when they are tender take them out of the liquor and set them to cool; when quite cold put them into the same liquor again, and if there is not sufficient liquor, boil some more vinegar, white wine, and spices; put by in jars.

Eels Potted.—Clean, skin and bone them; season them well on both

sides with pepper, salt and mace; let them lie for six hours; then cut them into small pieces, and pack them closely into a dish; cover them with a coarse paste and bake them; when quite cold remove the paste, and pour over them clarified butter.

Salmon Broiled.—Cut the fish in inch slices from the best part, season well with pepper and salt; wrap each slice in white paper, which has been buttered with fresh butter; fasten each end by twisting or tying; broil over a very clear fire eight minutes. A coke fire, if kept clear and bright, is best. Serve with butter, anchovy, or tomato sauce.

Dried Salmon Broiled.—Cut and cook as above, save that when it is warmed through it is enough. Serve plain, if for breakfast, or with egg sauce, if for dinner.

Salmon Roasted.—Take a large piece of the middle of a very fine salmon, dredge well with flour, and while roasting baste it with butter. Serve, garnished with lemon.

Stewed Salmon.—Scrape the scales clean off, cut it in slices, stew them in rich white gravy, add, immediately previous to serving, one tablespoonful of essence of anchovies, a little parsley, chopped very fine, and a pinch of salt.

Cod, Salt Boiled.—Before cooking, soak it for some hours in cold water, and then boil it gently until it is tender. It is usually eaten with melted butter and egg sauce, and served with boiled parsnips.

Cod Broiled.—Having well cleaned the fish, cut it into slices of about an inch thick; dry them well with a clean cloth, then rub them with thick melted butter, and sprinkle a little salt over them. Place them on a gridiron over a clear fire, and when one side is done, turn them carefully to broil the other. Serve with melted butter and anchovy sauce.

Cod Crimped.—Cut a fresh cod into slices, lay them for three hours in salt and water, with a glass of vinegar added; the fish may then be either boiled, broiled, or fried.

Cod Curried.—Slices of cold cod may be dressed in this way. Fry the slices with sliced onions in butter, then stew them in white gravy thickened with a dessertspoonful of curry powder and a teacupful of cream.

Cod Fried.—Cut the middle or tail of the fish into slices an inch thick, season them with salt and pepper, and fry them of a light brown on both sides; drain them on a sieve before the fire, and serve them on a well-heated napkin with plenty of crisped parsley round them. Serve with melted butter and anchovy sauce.

Cod Pie.—Take dressed cod and cold oyster sauce; put a little of the sauce at the bottom of a pie-dish, then a layer of flakes of cod, with a little of the liver cut in small pieces; season with pepper, salt, and nutmeg; repeat the layers until the dish is full, cover it with bread crumbs and pieces of fresh butter; bake for three-quarters of an hour, and let the top be quite brown. A couple of sounds well soaked, boiled tender, and cut in small pieces, are a great improvement.

Matelote of Fish.—Make a matelote sauce by tossing in butter in a stewpan over the fire, some small onions and button mushrooms, dredge in some flour, add a bunch of herbs, moisten with wine, and when the whole is hot, put in your cold fish, rewarm it quickly, and when sent to table, sprinkle it with a little brandy.

Croquettes of Cold Fish.—The flesh of cold fish being nicely boned, mince it fine; season it highly with herbs, spices, &c.; moisten it with a little white sauce; add bread crumbs soaked in beaten yolk of egg; form this mixture into cakes, and fry them till browned.

Fish Warmed a la Tartare.—Bone and trim pieces of cold fish, soak them in olive oil, then dip them in egg and bread crumbs, broil them quickly, and serve them upon a Tartar sauce highly seasoned.

Curry of Cold Fish.—This is one of the most excellent ways of warming cold fish; bone, skin, and cut up the large kinds, and do the smaller sorts in rather thick cutlets or whole; put into a stewpan, a good lump of

butter and a tablespoonful each of chopped pickles and preserved tomatoes, when these are hot add a tablespoonful of curry which you have mixed with half a pint of milk or cream and the beaten yolks of two eggs; make the whole quite hot, being careful to stir it gently; add the fish, and when this has become hot, serve all together, with a good rim of boiled rice round the dish, and the juice of half a lemon squeezed over.

Omelette of Cold Fish.—The cold flesh of any kind of fish answers admirably for omelettes. Cut the boned fish pretty small, season it well, and to each tablespoonful allow two eggs; beat and strain the latter, and either mix the fish and eggs together before frying the omelette, or first put the fish into a hot buttered fryingpan, and when slightly browned pour the eggs over it; do not stir or turn the omelette while it is being dressed; a few teaspoonfuls of milk or anchovy liquor, &c., may be beaten in with the eggs. Fold the omelette properly to send to table.

Hashed Fish.—Make a sauce by putting together in a saucepan over the fire, some white wine, butter rolled in flour, shred shallot, grated lemon rind, chopped anchovy, and enough water to moisten with; when this is quite hot, place in it sufficient boned and sliced fish; keep the whole closely covered over the fire until it is made perfectly hot. The flesh of shellfish is excellent warmed up in this way. Herbs may be introduced at discretion.

Hot Lobster or Crab.—Take the meat out of the main shell of the fish, divest it of the uneatable parts, and mix the remainder with a little shred anchovy, olive oil, lemon juice, and what seasoning you may fancy. Place the mixture in the shell, well butter it outside, and bake or broil until thoroughly hot. Serve with dry toast and crisp parsley.

Branade de Poisson.—Finely mince and mash some cold boiled fish; melt some fresh butter in a stewpan, add to it a little shred parsley and a bruised garlic; put in the fish, stir well gradually, while you are stirring drop in upon the fish enough olive oil to give the whole the consistence of thick cream sauce; reduce it somewhat, add pepper, and serve it in a dish garnished with sippets of toast and fine prawns or crayfish.

Fish Fried in Batter.—Good-sized pieces cut from the larger kinds of cold fish are usually warmed up, by first dipping them into a thick batter, and afterwards frying them in plenty of oil, lard, or friture. When they are well browned on the outside, drain, and serve hot. Salt cod is particularly nice done in this way for breakfast.

Fish Chowder.—Fry a few slices of salt pork, dress and cut the fish in small pieces, pare and slice the potatoes and onions, then place them in the kettle, a layer of fish, then of the fried pork, potatoes, onions, &c., seasoning each layer with salt and pepper. Stew over a slow fire 30 minutes.

Soft Shell Crabs.—Take one dozen fine, fresh, live crabs, wash well in cold water, then dry well; have six eggs well beaten, plenty of pepper and salt; have one pound of good butter crackers pounded and well sifted, so that there will be no lumps in them; dip the crabs in the eggs and then roll in the crackers, and have one pound of good fresh butter in frying-pan; let it come to a good scorching heat, put the crabs in and fry to a light brown; have them dry; served hot. It is much looked for in the season by our guests.

To Dress Crabs Cold.—Open the crabs, take out all the flesh and fat, and the white meat from the claws; mix the meat well with half tablespoonful mustard, one half spoonful vinegar and half tablespoonful white pepper, and a pinch of cayenne. Then wash and clean the shells, fill with the meat thus prepared, and serve. Garnish with parsley. This is only the dressing for two crabs. It takes the meat of two crabs to fill one shell when prepared in this manner. Many use a larger proportion of seasoning, but this is quite sharp enough for most people. We think they are much better plain with no dressing, but this is a matter of taste.

Crab Minced.—Extract the meat from the shell, mince small, and place it in a saucepan with a gill of white wine, pepper, salt, nutmeg,

cayenne pepper, and two tablespoonfuls of vinegar; stew it for ten minutes; melt two ounces of butter with an anchovy and the yolks of two eggs; mix the whole well together, and thicken with stale bread crumbs; garnish with strips of thin toast and sprigs of parsley.

Crab Potted.—Cut the meat of a crab, parboiled, into small pieces; put a layer of these into a potting can, or any deep tin dish; sprinkle salt, pepper, cayenne, and pounded mace over; add a layer of the spawn and coral, then a layer of the cut meat, and so on, till all is used; press it down, pour melted butter over it, and let it stand for half an hour in a slow oven; take it out, leave it to cool, and then remove the butter, and turn the meat into small pots; pour clarified butter over them, and put by for use.

To Dress Crabs.—Scoop the meat from the shell, mix the meat into a paste with a little vinegar, bread crumbs, grated nutmeg, and a little butter, or sweet oil; return it into the shell, and serve. To serve this hot, it should be heated before the fire, and served up with dry toast cut into large squares or dice.

Baked Crabs.—Remove the meat from the shell, mix it with bread crumbs—about one-fourth will be sufficient; add white pepper, salt, a little cayenne, grated nutmeg, and half a dozen small lumps of butter, each about the size of a nut; this last ingredient should be added to the fish, after it has been returned to the shell. Squeeze lemon juice over it; lay a thick coat of bread crumbs over all, and bake.

Lobster Salad.—Take inside of large lobster, mince fine; take yolk of 2 eggs boiled hard and mashed fine, with four tablespoonfuls of sweet oil; pepper, salt, vinegar, and mustard to taste; mix well; add celery or lettuce to taste; then when serving, garnish with hard-boiled eggs.

Boiled Crabs.—Boil them in water and salt twenty-five minutes, take out, break claws, and wipe clean; put large claws on plates, cracked, and sent to table buttered on shell, with sweet oil to beautify them.

Lobsters, to Boil.—Set over the fire a sauce-pan containing water salted in the proportion of a tablespoonful of salt to a quart of water; when the water boils, put the lobster in, and keep boiling briskly from half an hour to an hour according to the size of the fish; then take the lobster out, wipe all scum from it, and rub the shell with a very little oil or butter, to give it a gloss.

Lobsters, to Choose—As a rule, it is better to buy lobsters alive. Choose those which are heavy and lively, and full of motion, which is an index of their health and freshness. Those of middle size are the best. Always reject them when the shell is encrusted, this being an infallible sign that they are old. The hen lobster is distinguished from the male by having a broader tail and less claws. When boiled, the tail of the lobster preserve its elasticity if fresh, but loses it as soon as it becomes stale. The heaviest lobsters are the best; and when they are light and watery, they are unfit for eating.

Lobster Sauce.—Choose a lobster that is well filled with spawn; pull the flesh to pieces with a fork, and bruise it with the spawn with the back of a spoon; break the shell, and boil it in a little water to extract its coloring matter; strain it off; melt some butter very smoothly on it, with a little horseradish; after a few moments, take out the horseradish, mix the body of the lobster well with the butter; then add the flesh, and give it a boil, either with ketchup, or gravy, or butter.

Lobster Stewed.—Extract from the shells of two lobsters, previously boiled, all of the meat; take two-thirds of a quart of water, and stew the shells in it, with mace, unground pepper, and salt. Let it boil an hour or more, till you have obtained all that is to be got from them; then strain. Add the richest portions of the lobster, and some of the best of the firm meat, to some thin melted butter; squeeze a little lemon juice into it, add a tablespoonful of Madeira, pour this into the gravy, and when warmed it is ready to serve.

Lobster Butter.—The hen lobster should be selected, on account of the coral, take out the meat and spawn, and bruise it in a mortar; add to it a teaspoonful of white wine, season with pepper, salt, nutmeg, and a little grated lemon peel; add four ounces of butter, slightly dusted over with flour. Work this well together, and rub it through a hair sieve. It should be kept in a cool place till ready to serve.

To Roast Lobsters.—Take a live lobster, half boil it, take it from the kettle in which it is boiling, dry it with a cloth, and while hot, rub it over with butter, and set it before a good fire, basting it with butter; when it produces a fine froth, it is done. Serve with melted butter.

Mackerel.—Clean the fish thoroughly, remove the roe, steep it in vinegar and water, and replace it; place the fish in water from which the chill has been taken, and boil very slowly from fifteen to twenty minutes; the best criterion is the starting of the eyes and splitting of the tail—when that takes place, the fish is done; take it out instantly, or you will not preserve it whole. Garnish with parsley, and chopped parsley in melted butter, serve up as sauce.

To Bake Mackerel.—Open and clean thoroughly, wipe very dry, pepper and salt the inside, and put in a stuffing composed of powdered bread crumbs, the roe chopped small, parsley, and sweet herbs, but very few of the latter, work these together with the yolk of an egg, pepper and salt to taste, and sew it in the fish; then place the latter in a deep baking dish, and dredge it with flour slightly, adding a little cold butter in small pieces, put the fish into an oven, and twenty-eight or thirty minutes will suffice to cook them. Send them in a hot dish to table, with parsley and butter.

Oysters, Dietetic Properties of.—Few articles of food are more nourishing and digestible than the oyster when eaten raw or slightly cooked; with some persons, however, oysters even in a raw state disagree; in this case, each oyster should be dipped before it is eaten in a sauce composed of vinegar, pepper, and shallots or mild onions, chopped fine. Oysters should be eaten the moment they are opened, for if not eaten when absolutely alive their flavor and spirit are lost. When too many oysters have been incautiously eaten and are felt lying cold and heavy on the stomach, an infallible remedy will be found in hot milk, of which half a pint may be drunk, and it will quickly dissolve the oysters into a bland, creamy jelly. Weak and consumptive persons should always take this after their meal of oysters. The drinking of wine or spirits immediately after eating oysters is injudicious, and calculated to make the oysters disagree. The best beverage is porter or stout. Oysters are especially well adapted for supper, on account of their digestible properties, but in order to afford the greatest amount of nutriment they should be taken fasting.

Oysters Broiled.—Take them from the shells, beard them, and put them with their liquor into scollop tins with a little pepper and butter; put the shells upon a gridiron over a good fire, and serve them when plump and quite hot; squeeze a little lemon juice over them as they come from the fire. To be had to perfection, they should be cooked in the room in which they are eaten.

To Fry Oysters.—Take those that are large, dip them in beaten eggs, and then in flour, or fine bread crumbs—fry them in lard, till of a light brown. They are a nice garnish for fish. They will keep good for several months if fried when first caught, salted and peppered, then put into a bottle, and corked tight. Whenever they are to be eaten, warm them in a little water.

Stewed Oysters.—Strain the oyster liquor, rinse the bits of shells off the oysters, then turn the liquor back on to the oysters, and put them in a stew pan—set them where they will boil up, then turn them on to buttered toast—salt, pepper, and butter them to your taste. Some cooks add a little walnut catsup, or vinegar. The oysters should not be cooked till just before they are to be eaten.

Oyster Pancakes.—Mix equal quantities of milk and oyster juice together. To a pint of the liquor when mixed, put a pint of wheat flour, a few oysters, a couple of eggs, and a little salt. Drop by the large spoonful in hot lard.

Roast Oysters.—Large oysters not opened, a few minutes before they are wanted, put them on a gridiron over a moderate fire. When done they will open; do not lose the liquor that is in the shell with the oysters; serve them hot upon a napkin.

Oyster Pickle.—Open the oysters very carefully and remove every particle of shell adhering to the fish; put the oysters into a little water, wash them in it, and strain the liquor; boil it with a little vinegar, whole pepper, salt, and mace, till it tastes of the spices; then put in the oysters. If they are large they must boil for eight minutes, if small, not so long. Put them into pickle jars, and when the liquor is cold, pour it upon the oysters. To four dozen oysters put six spoonfuls of water and four of very good vinegar, tie the jars securely down with bladder.

Oyster Fritters.—Beard, dip them into an omelette, sprinkle well with crumbs of bread, and fry them brown.

Scalloped Oysters.—Beard the oysters, wash in their own liquor, steep bread crumbs in the latter, put them with the oysters into scallop shells, with a bit of butter, and seasoning of salt, pepper, and a little grated nutmeg; make a paste with bread crumbs and butter; cover, and roast them before the fire, or in an oven.

Scallops.—Are nice boiled, and then fried, or boiled and pickled, in the same manner as oysters. Take them out of the shells—when boiled, pick out the hearts, and throw the rest away as the heart is the only part that is healthy to eat. Dip the hearts in flour, and fry them in lard till brown. Hearts are good stewed, with a little water, butter, salt, and pepper.

Potato Soup.—Put three pounds of shin of beef or any scraps of meat or poultry or bones you may have, with a small slice of ham or bacon, in a saucepan, with three quarts of cold water, some salt, some whole peppers, two onions, one carrot, one-half turnip, half a leek, some celery tops, and two sprigs of parsley, and let it simmer slowly for three or four hours, skimming occasionally; then add eight or ten raw, peeled potatoes and when they are perfectly tender mash it all through a colander. Put it back on the fire, and when boiling, add a small tablespoonful of flour, wet with cold water. Let it boil a few minutes, and then strain through a sieve. This makes a delicious, smooth, rich soup.

Rabbit Soup.—Take two full-grown or three young rabbits; cut them into joints, flour, and fry them lightly; add to them three onions of moderate size, also fried to a clear brown; on these pour gradually seven pints of boiling water, throw in a large teaspoonful of salt, clear off all the scum carefully as it rises, and then put to the soup a bunch of parsley, four medium-sized carrots, and a small teaspoonful of peppercorns; boil the whole very gently for five hours or five hours and a half; add more salt if needed, strain off the soup, let it cool sufficiently for the fat to be skimmed clear from it, heat it afresh, and send it to table with sippets of fried bread; add a thickening of rice flour or of wheaten flour browned in the oven and mixed with a spoonful or two of ketchup.

Game Soup.—Break the bones of cold cooked game, and cut the meat in pieces; boil the bones and meat in broth for an hour or more, then thicken the soup with the yolks of eggs and with boiled cream, and season according to taste. Care must be taken not to boil the soup after the eggs are mixed in it, or it will curdle.

Gravy—Clear.—Slice some beef thinly, broil a part of it over a clear, quick fire, just enough to give color to the gravy, but not to dress it; put this with the raw remainder into a tinned stewpan with a couple of onions, one or two cloves, a whole black pepper, berries of allspice, and a few sweet herbs; cover it with hot water, give it one boil, and skim it two or three times, then cover it, and let it simmer till quite strong.

Pea Soup.—Beef 5 lbs., water 5 qts., 6 large carrots, 6 good turnips, 3 large onions, salt sufficient, put it on a good slow fire, let it boil three hours, then strain all the broth from meat and vegetables, and then add 3 lbs. of split peas to the broth; set it on a slow fire for 2 hours, stirring often, so that all the peas will dissolve; take 1 lb. fresh sausage meat, fried to a crisp, and fried bread crumbs; put altogether, add a few fine herbs, and serve hot.

Oyster Soup.—Separate the oysters from the liquor; to each quart of the liquor, put a pint of milk or water set it on the fire with the oysters. Mix a heaping tablespoonful of flour with a little water, and stir it into the liquor as soon as it boils. Season it with salt, pepper, and a little walnut, or butternut vinegar, if you have it, if not, common vinegar may be substituted. Put in a small lump of butter, and turn it as soon as it boils up again on to buttered toast, cut into small pieces.

Scotch Broth.—Take four pounds of mutton (part of the leg is best), add one gallon of water, one teacupful of pearl barley, two carrots sliced, two turnips sliced, two onions cut small, three carrots grated, the white part of a large cabbage, chopped very small, and a small quantity of parsley. Season with salt and pepper. Let this boil very gently for three hours and a half, and at the dinner-table it will most likely, by all who are fond of soups, be pronounced excellent.

Vegetable Soup.—Pare and slice five or six cucumbers; and add to these the insides of as many lettuces, a sprig or two of young peas, and a little parsley. Put these with half a pound of fresh butter, into a saucepan, to stew in their own liquor, near a gentle fire, half an hour; then pour two quarts of boiling water to the vegetables, and stew them for two hours; rub down a little flour into a teacupful of water, boil it with the remainder of the ingredients for fifteen or twenty minutes, and serve it.

Vermicelli Soup.—Take three quarts of common stock and one of the gravy, mixed together; put a quarter of a pound of vermicelli, blanched in two quarts of water, into the soup, boil it up for ten minutes, and season it with salt if requisite; put it in a tureen with a crust of French roll baked.

Mock Turtle Soup.—Procure a fresh calf's head with the skin on, take out the brains, wash the head several times in cold water, let it soak for about an hour in spring water, then lay it in a stewpan, and cover it with cold water, and half a gallon besides; remove the scum as it rises; let it boil gently for an hour, take it up, and when almost cold, cut the head into pieces about an inch and a half by an inch and a quarter, and the tongue into smaller pieces. When the head is taken out, put in the stock meat, about five pounds of knuckle of veal and as much beef; add to the stock all the trimmings and bones of the head, skim it well, and then cover it close, and let it boil for five hours; then strain it off and suffer it to stand till next morning, then take off the fat, set a large stewpan over the fire with half a pound of fresh butter, twelve ounces of onion sliced, and four ounces of green sage; let them fry for an hour, then rub in half a pound of flour, and by degrees add the broth until the mixture is of the consistence of cream, season it with a quarter of a pound of ground allspice and half an ounce of black pepper ground very fine; add salt to taste, and the rind of a lemon thinly pared; let it simmer very gently for an hour and a half, then strain it through a hair-sieve; do not rub the soup to hasten it through the sieve; if it does not run easily, knock the wooden spoon against the side of the sieve; put it into a clean stewpan with the head, and season it by adding to each gallon of soup half a pint of white wine and two tablespoonfuls of lemon-juice; let it simmer gently till the meat is tender, which will be in about three-quarters of an hour; take care that it is not overdone; stir it frequently, to prevent the meat sticking to the bottom of the stewpan. When the meat is quite tender, the soup is ready.

Beef or Black Soup.—The shank of beef is the best part for soup—cold roast beef bones, and beef steak, make very good soup. Boil the shank four or five hours in water, enough to cover it. Half an hour before the soup is

put on the table, take up the meat, thicken the soup with scorched flour, mixed with cold water, season it with salt, pepper, cloves, mace, a little walnut, or tomato catsup improves it, put in sweet herbs or herb spirit if you like. Some cooks boil onions in the soup, but as they are very disagreeable to many persons, it is better to boil and serve them up in a dish by themselves. Make forcemeat balls of part of the beef and pork, season them with mace, cloves, pepper, and salt, and boil them in the soup fifteen minutes.

Calf's Head Soup.—Parboil a calf's head, take off the skin and cut it into pieces of about an inch and a half square; mince the fleshy part into smaller pieces; take out the back part of the eyes, and cut the remainder into rings; skin the tongue, and cut it into slices; turn the whole into three quarts of good stock, and season with cayenne pepper, two or three blades of mace, and salt; add the peel of half a lemon, half a pint of white wine, and a dozen forcemeat balls; stew the whole for an hour and a half. Rub down two tablespoonfuls of flour with a little cold water, mix it well with half a pint of the soup, and then stir it into the pot; add the juice of half a lemon, and the yolks of eight eggs, hard boiled; let it simmer for ten minutes and serve in a tureen.

Soup Herb Spirit.—Those who like a variety of herbs in soup will find it very convenient to have the following mixture: Take, when in their prime, thyme, sweet marjoram, sweet basil, and summer savory. When thoroughly dried pound and sift them. Steep them in brandy for a fortnight; the spirit will then be fit for use.

Chicken Broth.—Joint a chicken, wash the pieces, put them into a stewpan with three pints of water, and add two ounces of rice, two or three blades of mace, some white pepper whole, and a pinch of salt; let it come to a boil, skim frequently, and simmer for three hours; boil for five minutes in the soup some vermicelli, and serve with it in the soup.

Sheep's Head Broth.—Split the sheep's head, and well wash it, take out the brains, let the head soak for an hour in cold water; boil three-quarters of a pound of Scotch barley in eight quarts of water, and when it boils, put in the head with a neck of mutton; slice carrots thin, and cut turnips small and add them with some salt; let it boil for three hours, and skim with care and frequency. When it has boiled two hours and a half add some onions chopped very fine. In warming up this soup it must be stirred gently over a clear fire, and allowed to boil no longer than three minutes.

Mulligatawny Soup.—A calf's head divided, well cleaned, and placed with a cow-heel in a well-tinned saucepan; boil them till tender, let them cool, cut the meat from the bones in slices, and fry them in butter; stew the bones of the head and heel for some hours; when well stewed, strain, let it get cold and remove the fat. When this is accomplished, cut four onions in slices, flour them, fry them in butter until brown, add a tablespoonful and a half of best curry powder obtainable, cayenne pepper one tea spoonful, with a little salt; turmeric powder sufficient to fill a dessert-spoon is sometimes added, but the improvement is not manifest to a refined palate, the curry powder being deemed all that is necessary; add these last ingredients to the soup, boil gently for about an hour and a half, then add two dessert-spoonfuls of Harvey's sauce, and serve.

Beef Gravy.—Take three pounds of beef steak, a knuckle of veal, five carrots, six onions, two cloves, two bay leaves, a bunch of parsley, and scallions; put all these into a stew pan, with two ladlefuls of broth, and set them over a good fire to reduce them, cover the stove, and let the stewpan stand over it until the meat begins to give out the gravy, and adheres slightly; the jelly at the bottom of the stewpan ought to be nearly black, and when that is the case, take it from the stove, and let it stand for ten minutes; then fill the stewpan with good broth or water (if the latter, not so large a quantity), let this simmer for three hours, skim and season it well; if water is used instead of broth, the gravy must be strained first.

Gravy Soup.—Take a leg of beef, well-wash and soak it, break the

bone, put it into a saucepan with a gallon of water, a large bunch of sweet herbs, two large onions sliced and fried to a nice brown, taking great care they are not burnt, two blades of mace, three cloves, twenty berries of allspice, and forty of black pepper, and stew till the soup is as rich as you wish it to be, then take out the meat; when it is cold, take off the fat, heat the soup with vermicelli, and the nicest part of a head of celery boiled and cut to pieces, cayenne, and a little salt; carrot may be added, with turnip cut up into small pieces, and boiled with spinach and endive, or the herbs without the vermicelli, or vermicelli only; add also a large spoonful of soy, and one of mushroom ketchup; a French roll should be made hot and put into the soup.

Venison Soup.—Take four pounds of freshly-killed venison cut off from the bones, and one pound of ham in small slices. Add an onion minced, and black pepper to your taste. Put only as much water as will cover it, and stew it gently for an hour, keeping the pot closely covered. Skim it well, and pour in a quart of boiling water. Add a head of celery cut small, and three blades of mace. Boil it gently two hours and a half; then put in a quarter of a pound of butter, cut small and rolled in flour, and half-pint of Port, or Madeira. Let it boil a quarter of an hour longer, and send it to the table with the meat in it.

Blood or Veal Gravy.—Put a few slices of ham into a thick stewpan, and lay over it some slices of lean veal, half cover the meat with jelly stock, stew it over a brisk fire, taking care that it does not burn; when the broth is reduced, thrust a knife into the meat so that the gravy may run out, then stew it more gently till brown, and turn the meat frequently; when of dark red color, moisten with hot stock, season with shred mushrooms, parsley, and green onions; when it has boiled an hour, skim and strain it through a tammy to clarify for use.

Veal Broth.—Stew a knuckle of veal; draw gravy as for stock, add four quarts of water, with celery, parsley, and an onion; simmer till reduced to half, then add two or three ounces of rice, but not until the soup is nearly cooked, so that when served the rice may be no more than done. Vermicelli may be used in preference, or for change.

Mutton Broth.—Three pounds of serag of mutton, put into two quarts of cold water, add onion, turnips, pepper, and salt, a few sweet herbs, and a little pearl barley; skim well, and boil four hours. These ingredients chiefly depend upon whether the dish is made for an invalid; if so, the omission of any of the ingredients will be regulated according to the advice of the medical attendant.

White Portable Soup.—Procure as fine a leg of veal as can be obtained, bone it, remove the whole of the skin and fat, chop in pieces two dozen fowls' feet, wash them well, put them into a large iron kettle with three gallons of water, and stew until the meat is tender enough to separate, then cover down close and stew for eight hours; take a tea-cup and fill it with the soup, set it where it can quickly cool, if when cold it is hard enough to cut with a knife, strain through a sieve and remove all the fat, pour into cups the clear jelly, and put them into a stewpan with boiling water until they are like glue; let them cool; and when nearly cold, run a ring round them and turn them on to a piece of new flannel; it will draw all the moisture out of them: turn them in seven hours, and continue until they are very hard; put them in tin canisters in a dry place. When any is required, cut a piece about the size of a walnut, pour a pint of boiling water upon it, stir until the soup is dissolved, and season with salt, it will make a basin of strong broth; if for soup, steep some vermicelli in water, and boil it; then to one cake of the soup pour one pint of water; if two quarts or four pints of soup are required, take four cakes of the soup, and when melted, set it over the fire and simmer; pour it into a soup tureen, add thin slices of bread very lightly toasted, and upon them the vermicelli, season to palate.

Calves' Tail Soup.—Get three calves' tails, let them be cut in joints,

and, after bleaching, put them into some good white stock, and stew them well for several hours.

Lambs' Tail Soup.—Four lambs' tails, cut in joints, will make this soup, proceeding the same way as the former, leaving out sweet herbs; add cream, as to the former, and one glass of white wine.

Mutton Soup.—Cut a neck of mutton into four pieces, and put it aside, then take a slice of the gammon of bacon and put it in a saucepan with a quart of peas and enough water to boil them; let the peas boil to a pulp; then strain them through a cloth, and put them aside; add enough water to that in which the bacon is to boil the mutton, slice three turnips, as many carrots, and boil for an hour slowly, adding sweet herbs, onions, cabbage, and lettuces chopped small; then stew a quarter of an hour longer, sufficient to cook the mutton, then take it out, and take some fresh green peas, add them, with some chopped parsley and the peas first boiled, to the soup, put in a lump of butter rolled in flour, and stew till the green peas are done.

Lamb Soup.—May be cooked as mutton. save that beef may be substituted for the bacon.

Leg of Beef Broth.—Take a leg of beef, break the bone in several places, place it in a pan with a gallon of water, remove the scum as it rises, and add three blades of mace, a crust of bread, and a small pinch of parsley; boil till the beef is tender; toast some bread, cut it in diamonds, lay it in the bottom of the tureen, put the meat on it, and pour the broth over all.

Maccaroni Soup.—After you have blanched it, cut some pipe maccaroni, about an inch long; do not boil it too much; it will take longer than vermicelli; keep the pieces in cold water until you require them for your soup, when you will strain them off, and add to your consommé; season for Italian soup; send up on a small plate or dish, on a napkin, some grated Parmesan cheese.

Maccaroni Soup.— Take a given weight of maccaroni in proportion to the quantity of soup required (say one pound), and boil it in a quart of white stock until it is tender; then take out one-half, and keep the other boiling until it is reduced to a pulp. Add sufficient stock until the whole, with half a pint of cream, boiling, make five pints; grate eight ounces of Parmesan cheese, and add the half of the maccaroni which had only been boiled tender, warm it without boiling, and serve with toast.

Curry Soup.—Cut the meat from an ox-cheek, and soak it well, then put it in a stewpan, with four onions cut in slices, and a bunch of potherbs; add three quarts of water; remove the scum frequently, and strain; add also half a pound of soaked rice, one teaspoonful of curry-powder, a little pepper and salt, and stew four hours.

Ox Tail.—One tail will do for a tureen of soup; cut it into joints,—your butcher will cut it for you; blanch it a few minutes in water, then add some good clear second stock to the pieces, and let them gently boil until tender; skim off all grease from them; add sufficient consommé stock, also add exactly the same roots as for sauté soup, in shape and size similar to the roots you would cut for a haricot, and use small button onions instead of cut onions; season as before; dish the pieces of tail into the soup tureen with a large ragout spoon, or you will smash them.

Hare Soup.—An old hare is fitted only for soup or jugging. To render it into soup let it be cleaned, cut into pieces, and add a pound and a half or two pounds of beef, to which there is little or no fat; place it at the bottom of the pan, then add two or three slices of ham or bacon, or a little of both, a couple of onions, and some sweet herbs; add four quarts of boiling water, let it stew to shreds, strain off the soup, and take away the fat; reboil it, add a spoonful of soy or Harvey's sauce, and send to table with a few forcemeat balls.

Partridge Soup.—When you have a brace of partridges which prove to be remarkably old, convert them into soup; skin and cut them up, cut a

handsome slice of ham as lean as possible, and divide it into four, or cut as many thin slices, put them into the pan, add the partridges with an onion sliced, some celery, and four ounces of butter, brown nicely without burning, put them into the stewpan with three pints of water, throw in a few white peppers whole, a shank of mutton, salt it to palate, strain, add stewed celery, fried bread, and, previous to its boiling skim very clean, and serve up.

Eel Soup.—Take any number of pounds of eels according to the quantity required; add two-thirds water. If about three or four pounds of eels add one onion, a small quantity of mace, a little pepper whole, sweet herbs, a crust of the top side of bread, cover down close, and stew till the fish separates, then strain. Toast slices of bread deep brown, but not to burn, and cut into triangular pieces or squares a piece of carrot, two inches long, cut into four slices lengthways, put into a tureen with the toast, and pour the soup on; boiling cream may be added, thickened with a little flour, but it should be rich enough without it.

Cabbage Soup.—Take four or six pounds of beef, boil with it some black pepper whole for three hours, cut three or four cabbages in quarters, let them boil until they are quite tender, then turn them into a dish and serve all together.

Carrot Soup.—Take a proportionate number of carrots to the quantity of soup to be made—if a small quantity, six will do; they should be large and of a rich color; cut them after being thoroughly scraped into thin slices, stew them in some rich stock, say two quarts, until they are tender through, then force them through a sieve or tammy with a wooden spoon, until a red pulp is deposited, reboil it with the stock until it is rich and thick, and season with grated white sugar, cayenne pepper and salt.

Celery Soup.—Stew fine white celery cut into small slips in gravy, then boil it in good gravy.

Herb Soup.—Slice three large but young cucumbers, a handful of spring onions, and six lettuces; cut the last small. Put into a stewpan eight ounces of butter, and with it the above vegetables; when the butter has melted, cover, and let it stand over a slow fire an hour and twenty minutes. Add as much stock as may be required for the quantity of soup intended to be served; let it boil and simmer for an hour, then thicken with flour and butter, or three tablespoonfuls of cream. If desired to be colored, use spinach juice.

Rice Soup.—Steep some fine rice in cold water for an hour, say four ounces, then boil it, add three quarts of gravy, a pinch of cayenne, a little salt, and boil five minutes.

Maize Soup.—Melt half a pound of butter in a stew pan, and add four heads of celery, the outside stalks, if well cleaned, will be of service; slice five onions, and throw in with twenty or thirty sprigs of spinach; cut up four turnips, and add sweet herbs and parsley; simmer for three-quarters of an hour, then pour in five pints of water, stew for half an hour, and serve with sippets of toasted bread.

Onion Soup.—In two quarts of weak mutton broth slice two turnips and as many carrots; then strain it. Fry six onions cut in slices, when nicely browned add them to the broth; simmer three hours, skim and serve.

Soup of Spanish Onions.—Put in a stewpan with four Spanish onions four ounces of butter, a head of celery, a large turnip, a quart of white gravy, and stew until the onions are quite tender, then add another quart of gravy and strain. Pulp the vegetables, return them to the soup, and boil for half an hour. Keep constantly stirring; and immediately previous to serving, thicken with rice flour worked in butter.

Pea Soup.—Boil to a pulp two quarts of peas, strain them, place in a stewpan four ounces of butter, add two anchovies, a tablespoonful of pounded pepper, twice that quantity of salt, a small handful of parsley and mint, a little beet-root and spinach, and stew until tender. Add pulped peas

until the soup is of the proper consistency, then throw in a spoonful of loaf sugar, boil up and serve.

Pepper Pot.—Put in a stew pan three quarts of water, to this add celery, turnips, carrots, lettuces, cut small, also add the bones of cold roast meat of any description, half a pound of bacon, and the same weight of salted pork; stew gently until the meat is tender, taking care to skim when it first boils.

Boil half a peck of spinach and rub it through a colander, take the bones out of the soup and add the spinach, with it the meat of a lobster or crab minced, season with plenty of cayenne pepper, and salt to taste. Suet dumplings may be boiled with it, or a fowl, but this is a matter of taste. Mutton or beef may be substituted for bacon or pork; this will be obvious when it is understood that a pepper pot is presumed to consist of an equal proportion of flesh, fish, fowl, and vegetables.

Chowder.—Fry some slices cut from the fat part of pork, in a deep stewpan, mix sliced onions with a variety of sweet herbs, and lay them on the pork; bone and cut a fresh cod into thick slices, and place them on the pork, then put a layer of slices of pork, on that a layer of hard biscuit or crackers, then alternately, the pork, fish, and crackers, with the onions and herbs scattered through them till the pan is nearly full; season, pepper and salt, put in about two quarts of water, cover the stewpan close, and let it stand with fire above and below it four hours; then skim it well and serve it.

Hotch-Potch.—Put a pint of peas into a quart of water, and boil them until they are so tender as easily to be pulped through a sieve. Take of the leanest end of a loin of mutton three pounds, cut it into chops, put it into a saucepan with a gallon of water, four carrots, four turnips cut in small pieces, and season with pepper and salt. Boil until all the vegetables are quite tender, put in the pulped peas, a head of celery and an onion sliced; boil fifteen minutes and serve.

Apple Sauce, *Baked.*—Fill a quart basin with apples, pared, cored, and quartered; add a tablespoonful of water, cover it over, and set it in a moderate oven until the apples are reduced to a pulp; beat them with a spoon till quite smooth, adding a small piece of fresh butter, and sugar in sufficient quantity.

Apple Sauce, *Brown.*—Pare and core a pound of choice apples, and stew them in a teacupful of rich brown gravy until they have been become a thick and smooth marmalade; season with black pepper or cayenne, and serve very hot.

Apple Butter.—Peel, quarter, and core, one bushel of sweet apples; put them into a stew-pan over a gentle fire. When the apples begin to get soft, add the juice of three lemons, one pint of rum, and one pound of loaf sugar dissolved in a quart of water. Boil the whole together, and pour into jars.

Apples Baked.—Put the apples whole into an earthen pan, or jar, with a few cloves and a little lemon peel, some coarse sugar, and a glass of port wine; bake them in a quick oven, and take them out in an hour.

Apples Buttered.—Peel and core apples of the choicest kind, stew in their syrup as many as will fill the dish, and make a marmalade of the rest. Cover the dish with a thin layer of marmalade. Place the apples on this, with a bit of butter in the heart of each, lay the rest of the marmalade into the vacancies. Bake in the oven to a pale brown color, and powder with sugar.

Apples Dried.—Choose apples having clear rinds and without blemishes, wipe them, and put them on a baking pan into a very slow oven, let them remain for four or five hours; draw them out, rub them in the hand, and press them gently; return them to the oven, and press them again to a nearly flat shape; when cold, if they look dry, rub them over with a little clarified sugar.

Apples Frosted.—Peel some pippins, stew them in a thin syrup till they

become tender, dip them into the white of an egg that has been whipped into a froth, and sift pounded sugar over them thickly; put them in a cool oven to candy, and serve in a glass dish.

Apples in Butter.—Peel some small sized apples, and remove the cores without dividing them, place them in a pie dish upright and singly, and with a space between each; fill the vacancies left by the cores with sugar and grated lemon-peel; pour butter round and upon the apples, and bake in a moderate oven.

To Stew Cranberries.—To a pound of cranberries allow a pound of sugar; dissolve the sugar in a very little water, boil it for ten minutes, and skim it well; put them with the sugar and boil them slowly till they are quite soft.

New-England Apple-sauce or Butter.—Boil 2 brls. of new cider down to ½ a brl. Pare, core, and slice up 3 bushels of apples (sweet apples are preferable), and put them into the cider thus reduced, and still kept boiling briskly. Stir the whole mass constantly, to prevent burning, till of the consistence of soft butter. A small quantity of pulverized allspice, added during the boiling, is an improvement.

Baked Apple Sauce.—Put a tablespoonful of water into a basin, and fill it with apples, pared, quartered, and cored; put them into a moderate oven, until they are reduced to a pulp; beat them with a wooden spoon, adding a little sugar, and fresh butter.

Stewed Apple Sauce.—Pare and core some apples, put them into a preserve-pot, cover, and set it in a saucepan of water, to boil; when soft, mix them with some butter, and sweeten with brown sugar.

Apple Sauce.—Pare, core, and slice some apples, put them with a little water into the saucepan to prevent them from burning, and add a little lemon peel; when sufficiently done, take out the latter, bruise the apples, put in a bit of butter, and sweeten it.

Bread Sauce.—Cut in slices the crumb of a French roll, to which add a few peppercorns, one whole onion, a little salt, and boiling milk enough to cover it; let it simmer gently by the side of the fire till the bread soaks up the milk, then add a little thick cream, take out the onion and rub the whole through a sieve, make it very hot, and serve with game or fowls.

Lobster Sauce.—Pound the coral, pour upon it two spoonfuls of gravy, strain it into some melted butter, then put in the meat of the lobster, give it all one boil, and add the squeeze of a lemon; you may, if you please, add two anchovies pounded.

Mint Sauce.—Take some nice fresh mint, chop it very small, and mix it with vinegar and sugar.

Mustard Sauce.—Put two glasses of stock, shallots shred small, salt and pepper, into a saucepan, let them boil for half an hour, then add a teaspoonful of mustard, stir it in well, and use it when required.

Onion Sauce.—The onions must be peeled, and boiled till they are tender, then squeeze the water from them, chop them, and add butter that has been melted, rich and smooth, with a little good milk instead of water; give it one boil, serve it with boiled rabbits, partridges, scrag or knuckle of veal, or roast mutton; a turnip boiled with the onions draws out the strength.

Horseradish Sauce, Hot.—Slice two onions, and fry them in oil, and when they begin to color, put them in a saucepan with a glass of white wine, the same of broth, two slices of lemon peeled, two cloves of garlic, a bay leaf, thyme, basil, and two cloves, boil these a quarter of an hour, and then strain it; add capers and an anchovy chopped, pepper, salt, and a spoonful of horseradish boiled to a pulp, and warm the whole without boiling.

Apple and Cranberry Sauce.—Pare and quarter the apples—if not tart, stew them in cider—if tart enough, stew them in water. When stewed soft, put in a small piece of butter, and sweeten it to the taste, with sugar. Another way, which is very good, is to boil the apples, without paring them, with a few quinces and molasses, in new cider, till reduced to half the

quantity. When cool, strain the sauce. This kind of sauce will keep good several months. It makes very good plain pies, with the addition of a little cinnamon or cloves. To make cranberry sauce, nothing more is necessary than to stew the cranberries till soft, then stir in sugar and molasses to sweeten it. Let the sugar scald in it a few minutes. Strain if you like—it is very good without straining.

Superior Sauce for Plum Pudding.—Mix six yolks of eggs with four spoonfuls of sifted sugar and butter mixed together; have a pint of boiling cream, which you will mix with your yolks, afterwards put it on the fire, and stir it until it is of the consistency of sauce, then add to it a wine-glass of brandy.

Tomato Sauce.—Obtain fresh tomatoes and take out the stalk, press them all tightly down in a stewpan, cover them, put them on the fire, strain off the liquor that is drawn from them, and add to the tomatoes a slice of raw ham, a few shallots, a few spoonfuls of good stock, let it stew for an hour, then rub it through a tammy sieve. Have in another stewpan a little good brown sauce, put your tomatoes into it, boil all together, season with cayenne, salt, sugar, and lemon juice.

Sauce Italienne.—Put in some lemon thyme, parsley, and mushrooms, shred small and fine, into a stewpan, with a little butter and a clove of garlic, set it on a moderate fire, and as soon as the butter begins to fry pour in a little consommé, and let it stew till pretty thick, then take out the garlic, and add some butter sauce and a little lemon juice.

Sweet Sauce.—Put some cinnamon into a saucepan with as much water as will cover it, set it on the fire, and when it has boiled up once or twice add two spoonfuls of pounded sugar, a quarter of a pint of white wine, and two bay leaves; give the whole one boil, and then strain it for table.

Shallot Sauce.—Put a few chopped shallots into a little gravy, boiled clear, and nearly half as much vinegar; season with pepper and salt: boil for half an hour.

Sauce for Turtle, or Calf's Head.—To half a pint of hot melted butter, or beef gravy, put the juice and grated rind of half a lemon, a little sage, basil, or sweet marjoram, a little cayenne, or black pepper, and salt. Add a wine-glass of white wine just before you take it up.

Rice Sauce.—Boil one onion and half a teacup of rice with a blade of mace, till very soft, in water just enough to cover it; then stir in half a pint of milk, a little salt, and strain it. This is a nice accompaniment to game.

Brown Sauce.—Take a pound or two of beefsteak, two or three pounds of veal, some pickings of fowls, carrots, and onions; put all these into a saucepan, with a glass of water, and set it on a brisk fire; when very little moisture remains put it on a slow fire, that the jelly may take color without burning, and as soon as it is brown moisten it with stock or water, add a bunch of green onions, two bay leaves, and two cloves, salt it well, and set it on the fire for three hours, then strain; dilute a little roux with your liquor, and let it boil an hour over a gentle fire, then take off all the fat and strain it through a bolting cloth.

Caper Sauce for Fish.—Take some melted butter, into which throw a small bit of glaze, and when the sauce is in a state of readiness throw into it some choice capers, salt, and pepper, and a spoonful of essence of anchovies.

Caper Sauce, to Imitate.—Boil some parsley very slowly, to let it become of a bad color, then cut it up, but not fine, put it into melted butter, with a teaspoonful of salt and a dessertspoonful of vinegar; boil up, and then serve.

Calves' Brains, with Different Sauces.—Brains braised in wine and broth may be used with what sauces or ragout you please; such as fat livers, pigeons, sausages, onions, capers, fried bread. They take their name from the material with which they are mixed.

Fish Sauce, Without Butter.—Simmer a quarter of a pint of vinegar

and half a pint of soft water, together with an onion, half a stick of horse-radish scraped, four cloves, two blades of mace, and half a teaspoonful of black pepper. When the onion is quite tender chop it small, with a couple of anchovies, and set the whole to boil for a few minutes, with a table-spoonful of ketchup; in the meantime have ready, well beaten, the yolks of three eggs; strain them, mix the liquor by degrees with them, and when they are well mixed set the saucepan over a moderate fire, holding a basin in one hand, into which toss the sauce to and fro, and shake the saucepan over the fire to prevent the eggs from curdling.

Fish Sauce.—To about four ounces of melted butter add three table-spoonfuls of mushroom ketchup, a tablespoonful of essence of anchovies, a table-spoonful of white wine vinegar, some cayenne, and a tea-spoonful of soy.

Milk Sauce.—Two teacupfuls of sugar and one of butter, creamed together; one wine-glassful of wine, a little nutmeg; at the last moment pour a cupful of boiling milk over all, and stir well.

Nice Pudding Sauce.—Three eggs and a white of one additional; one heaping cup of sugar; beat eggs and sugar well together. Take one cup of boiling water and a piece of butter the size of an egg; let the butter melt in the water by setting it in the top of the tea-kettle. Just as you serve the sauce pour the liquid on to the sugar and eggs, stirring briskly.

Pudding Sauce.—Three quarters of a cup of butter, one and a half cup of sugar, one egg, juice and grated rind of a lemon; all beaten well together. Just before serving pour on the beaten mixture one pint of boiling water. This is good for all sorts of puddings.

Drawn Butter.—Rub two teaspoonfuls of flour into one-quarter pound of butter; add five tablespoonfuls of cold water. Set it into boiling water, let it melt, and heat till it begins to simmer, then it is done. If for fish, put in chopped boiled eggs and capers. If for boiled fowl, put in oysters before it is melted, and let them cook through while it is itself simmering.

Celery Sauce.—Cut three heads of fine white celery into two-inch lengths, keep them so, or shred them down as straws, then boil them a few minutes, strain them, return them into the stewpan, and put either some brown or white stock, and boil it until tender; if too much liquor reduce it by boiling; then add either white or brown sauce to it, season it with sugar, cayenne pepper, and salt.

Chervil Sauce.—Put a few mushrooms, parsley, chervils, shallots, two cloves, a bay leaf, and a few tarragon leaves, into some melted butter; let them soak for some time, then add a little broth, white wine, pepper, salt, then reduce it to a proper thickness, but do not skim it; when done, put in some chervil scalded and chopped; warm it all up together.

Egg Sauce.—Boil three eggs hard, cut them in small squares, and mix them in good butter sauce; make it very hot, and squeeze in some lemon juice before you serve it.

Fresh Pork Sauce.—Cut two or three good-sized onions into slices, and fry them lightly, then add a little broth, a few mushrooms chopped, a clove of garlic, vinegar, and spice; let it boil half an hour, reduce to a proper consistency, then skim and strain it.

Garlic Sauce.—Three or four garlics, divided, and boiled in a little white vinegar and white stock, with a small piece of lean ham; when reduced strain it off, and add either white or brown sauce to the liquor; season with salt, pepper, and sugar; but leave out the vinegar.

Brown Coloring for Made Dishes.—Take four ounces of sugar, beat it fine, put it into an iron frying-pan or earthen pipkin, set it over a clear fire, and when the sugar is melted it will be frothy, put it higher from the fire until it is a fine brown, keep stirring it all the time; fill the pan up with red wine, and take care that it does not boil over; add a little salt and lemon, put a little cloves and mace, a shallot or two, boil it gently for ten minutes, pour it in a basin till it is cold, then bottle it for use.

Mushroom White Sauce.—Have ready some cream sauce rather thinner than usual, to this put a few white mushrooms, reduce it to the proper consistence, and it is then ready.

Anchovy Sauce.—To about half a pint of melted butter put two tablespoonfuls of good essence of anchovies, with the juice of half a lemon. Serve very hot.

Wine Sauce.—Make thin a few ounces of melted butter, then add a tablespoonful or two of coarsely-pounded loaf sugar, and a glass of sherry with half a glass of brandy; a little grated lemon peel or nutmeg, or both together, are improvements.

To Boil Eggs.—They should be put into boiling water, and if you wish to have them soft boil them only three minutes. If you wish to have them hard enough to cut in slices, boil them five minutes. Another way, which is very nice, is to break the shells and drop the eggs into a pan of scalding hot water; let it stand till the white has set, then put the pan on a moderate fire, when the water boils up the eggs are cooked sufficiently. Eggs look very prettily cooked in this way, the yolk being just visible through the white. If you do not use the eggs for a garnish, serve them up with burnt butter.

Eggs Fricasseed.—Boil eggs hard, take out a portion of the yolks whole, cut the remainder into quarters with the whites. Make some good gravy boiling hot, put in minced thyme and parsley, and add it to the eggs with a little grated nutmeg; shake the whole up with a piece of butter until it is of the proper consistence. Garnish with eggs boiled hard, and chopped up fine.

Omelette.—A culinary preparation of French origin, something resembling a pancake or fritter. As omelettes are quickly and easily made, and afford an agreeable addition to a repast, the following general observations respecting them will be found worthy of notice:—The pan used for frying should be quite small, for if the omelette be composed of four or five eggs only, and then put into a large pan, it will necessarily spread over it and be thin; the only partial remedy, when the pan is not of the proper size, is to raise the handle of it high, and to keep the opposite end close down upon the fire, which will confine the eggs into a smaller space. No gravy should be poured into the dish with the omelette, for if it be properly done it will require none. Should the slight rawness, which is sometimes found in the middle of the inside, when the omelette is made the French way, be objected to, a heated shovel or a salamander may be held over it for an instant before it is folded on the dish. Omelettes may be made in a variety of ways as follows:—*Ordinary Omelette:*—Beat the yolks and whites of four eggs together, with a table-spoonful of milk and a little salt and pepper; put two ounces of butter into a frying pan, and let it remain until it begins to brown; then pour in the batter, and leave it undisturbed for a minute; turn up the edges of the omelette gently from the bottom of the pan with a fork; shake it to prevent it burning at the bottom, and fry it till of a light brown. It will not take more than five minutes frying. *Sweet Omelette:*—This is nothing more than the ordinary omelette, upon which powdered sugar is put before it is turned; when it is turned powder the outside also with white sugar, and press upon it a red-hot iron; the iron should be about half an inch square, and pressed in streaks from one end to the other. *Friar's Omelette:*—Boil a dozen apples, as for sauce; stir in a quarter of a pound of butter, and a quarter of a pound of powdered loaf sugar; when cold add four eggs, well beaten; put it into a baking dish, thickly strewed over with crumbs of bread, so as to adhere to the bottom and sides; then put in the apple mixture; strew crumbs of bread over the top; when baked turn it out, and grate loaf sugar over it. *Omelette Souffle:*—Put into a stewpan an ounce of butter; when melted add two tablespoonfuls of flour; stir them well over the fire, so that the flour be thoroughly done, but not colored; add by degrees a wineglassful of boiling cream, and four times the quantity of boiling milk; work it quite smooth, take it off

the fire, add four yolks of eggs, sugar to taste, a few grains of salt, and a tablespoonful of orange-flower water; whip up strongly the whites of eight eggs, mix them lightly in the batter; put the whole in a soufflé dish, and bake for an hour. *Omelette with fine herbs.*—After having well beaten up any number of eggs required, and mixed them with a little salt and a sprinkling of fine herbs, throw the whole into a frying-pan, in which a little butter has been previously melted; when fried sufficiently brown, turn the omelette over on the dish in which it is to be served.

Poached Eggs.—Break the eggs into a pan, beat them to a froth, then put them into a buttered tin pan; set the pan on a few coals, put in a small lump of butter, a little salt; let them cook very slowly, stirring them constantly till they become quite thick, then turn them on to buttered toast.

Eggs Fried.—Have ready a frying-pan containing hot fat, drop the eggs in separately, let them fry for one minute, then drop some more hot fat over them; three minutes will cook them. They do not require to be turned.

Oyster Omelette.—Whisk six eggs to a thick froth, then add by degrees a gill of cream, beat them well together, season the eggs with pepper and salt to taste; have ready one dozen fine oysters, cut them in half, pour the eggs into a pan of hot butter, and drop the oysters over it as equally as possible; fry it a light brown, and serve as an omelette. Should never be turned.

Omelette, with Ham.—Take one dozen eggs, two gills of cream, three tablespoonfuls of grated ham; beat the eggs very thick; add gradually the cream and ham; pepper and salt to your taste; have ready a pan of butter boiling hot, pour the omelette into it, and fry a light brown; the moment it is done it should be put on the table. Garnish with curled parsley.

Crab Omelette.—Take two dozen fine live crabs, that are taken from oysters when open; put in a frying pan one ounce of good fresh butter, and let it come to a good boil; put the crabs in and let them fry a light brown; drain them well; have three eggs now beaten together; put in omelette pan, and when half done put the crabs in, and roll up the omelette and serve hot.

To Preserve Eggs.—Take equal quantity of gum arabic and water; when the gum is dissolved coat the eggs with a brush; when the coating is dry add another coat, and the eggs will keep fresh till wanted.

To Tell Good Eggs.—If you desire to be certain that your eggs are good and fresh, put them in water; if the butts turn up they are not fresh. This is an infallible rule to distinguish a good egg from a bad one.

Green Peas.—A delicious vegetable, a grateful accessory to many dishes of a more substantial nature. Green peas should be sent to table *green*, no dish looks less tempting than peas if they wear an autumnal aspect. Peas should also be young, and as short a time as possible should be suffered to elapse between the periods of shelling and boiling. If it is a matter of consequence to send them to table in perfection, these rules must be strictly observed. They should be as near of a size as a discriminating eye can arrange them; they should then be put in a cullender, and some cold water suffered to run through them in order to wash them; then having the water in which they are to be boiled slightly salted, and boiling rapidly, pour in the peas; keep the saucepan uncovered, and keep them boiling swiftly until tender; they will take about twenty minutes, barely so long, unless older than they should be; drain completely, pour them into the tureen in which they are to be served, and in the centre put a slice of butter, and when it has melted, stir round the peas gently, adding pepper and salt; serve as quickly and as hot as possible.

How to Cook Potatoes.—Potatoes should always be boiled in their "jackets;" peeling a potato before boiling is offering a premium for water to run through it and making them waxy and unpalatable; they should be thoroughly washed and put into cold water.

To Boil New Potatoes.—The sooner the new potatoes are cooked,

after being dug, the better they will eat; clear off all the loose skins with a coarse towel and cold water; when they are thoroughly clean, put them into scalding water, a quarter of an hour or twenty minutes will be found sufficient to cook them; strain off the water dry, sprinkle a little salt over the potatoes, and send them to table. If very young, melted butter should accompany them.

Roasted Potatoes.—Clean thoroughly; nick a small piece out of the skin, and roast in the oven of the range; a little butter is sometimes rubbed over the skin to make them crisp.

Fried Potatoes.—Remove the peel from an uncooked potato. After it has been thoroughly washed, cut the potato into thin slices, and lay them in a pan with some fresh butter; fry gently a clear brown, then lay them one upon the other in a small dish, and send to table as an *entremet.*

Spinach.—The leaves of the spinach should be picked from the stems; it should then be well washed in clean cold water, until the whole of the dirt and grit is removed; three or four waters should be employed; it will not otherwise be got thoroughly clean; let it drain in a sieve, or shake it in a cloth, to remove the clinging water. Place it in a saucepan with boiling water; there should be very little; it will be done in ten minutes; squeeze out the water, chop the spinach finely, seasoning well with pepper and salt; pour three or four large spoonfuls of gravy over it, place it before the fire until much of the moisture has evaporated, and then serve.

Lettuces and Endives.—Are better, I think, only cut into pieces or into quarters, and dished neatly round, but they must be done in some good stock, and not put into thick sauce; but when you take them out after being done, you will press and form them, then boil down their liquor to a glaze, which will, when added to your already thick sauce, give the desired flavor; glaze the quarters before dishing them, pour the sauce under and round.

Beets.—Beets should not be cut or scraped before they are boiled, or the juice will run out, and make them insipid. In summer, they will boil in an hour—in winter, it takes three hours to boil them tender. The tops in summer are good boiled for greens. Boiled beets cut in slices, and put in cold spiced vinegar for several days, are very nice.

Leeks Boiled.—Wash them carefully, cut away all the green, slit each almost in two, tie them in bunches; boil them for twenty minutes in salted water; drain them, and serve upon a moistened toast, and any sauce you may prefer.

Hashed Leeks.—After boiling them as above, chop them up; toss them in some butter in a stewpan; add enough rich gravy, and simmer till this is pretty thick; serve surrounded with sippets.

Fried Leeks, &c.—Wash them thoroughly, and cut away all the green; slice the white tender part as thin as possible; make a good deal of butter hot in a frying-pan, put in the leeks, and continue stirring till they are nicely browned; drain off the superfluous fat, add rasped bread crumbs, and serve.

Leeks are famous in porridge; they are also put into a pie with fish; and are useful to replace onions when the latter are too strong flavored.

Parsnips Boiled.—Wash and brush them very carefully, and either peel and quarter them, or do them whole as they are, and peel them afterwards. They require plenty of water, and take from twenty minutes to an hour to boil. You may send them to table simply quartered or sliced, or mashed and tossed in enough butter. They are mostly served with salt fish or boiled salt pork; in the latter case they are to be boiled with the meat.

Fricassee of Parsnips.—When boiled beautifully white, cut them lengthwise into pieces two inches long, and make them hot in a sauce made of a few spoonfuls of white gravy and sufficient cream; add a bit of butter rolled in flour; season and serve.

Parsnips Fried.—Boil the parsnips until they are half done, lift them

out, and let them cool; slice them rather thickly, sprinkle them with salt and pepper, and fry them a pale brown in good butter. Serve them with roast meat, and dish them under it.

Peas Boiled.—Shell the peas, and as soon as possible place them in boiling water with a small bit of butter, a bunch of green mint, and a little soda or salt; boil them gently until they begin to sink, but never let them be done too soft; drain them in a colander; chop the leaves of the mint; place it round the dish with the peas, stir a piece of butter in with them, and serve directly. A dessertspoonful of loaf sugar added to the water in which they are boiled, makes the peas more mellow.

Petits Pois au Gras.—Shell a pint of young green peas; put them into a stewpan together with four ounces of veal fat finely minced, a dessertspoonful of loaf sugar, the juice of half a lemon, a little salt, half a pint of water, and an ounce of butter rolled in flour; bring it to boil quickly; shake well; and when the peas are done, serve all together with very small sippets of fried bread.

Stuffed Potatoes.—Peel some large raw potatoes; make them hollow by cutting them out with a knife; butter the insides and fill them with a white forcemeat; arrange them in a baking dish, and bake till brown. They may be buttered on the outside or dipped into egg and bread crumbs at fancy.

Potatoes with White Sauce.—Immediately you have boiled your potatoes, slice, season, and mask them with a rich white sauce. A sprinkling of capers may be added.

Cabbage, Boiled. Wash and pick it carefully, and if very large, quarter it. Put it into a saucepan with plenty of boiling water and a tablespoonful of salt; if any scum arises, take it off; boil till the stalk is tender. Keep the vegetable well covered with water all the time of boiling, and shut out any smoke or dirt arising from stirring the fire. The flavor of an old cabbage may be much improved by taking it up when half done, and putting it directly into another saucepan of fresh boiling water. When taken up, drain it in a cullender. It may either be served plain, or chopped up and seasoned with butter, pepper, and salt.

Red Cabbage Stewed.—Although most commonly served as a pickle, red cabbage is excellent stewed. Quarter a medium-sized cabbage, slice it thin; put it into a stewpan with half a pint of stock and a cupful of vinegar; add a slice of ham; cover it close and let it stew two or three hours; add pepper and salt, a tablespoonful of powdered loaf sugar, and a little gravy; reduce the latter, take out the ham, and serve the cabbage garnished with tossed sausages.

Fricassee of Red Cabbage.—Quarter and slice the cabbage; add two onions similarly sliced; simmer in a very little white gravy. When tender, pour in with it sufficient white sauce and a tablespoonful of strong vinegar.

Tomatoes Boiled.—Put them into plain boiling water, withdraw the saucepan from the fire somewhat; let the tomatoes merely simmer for ten minutes. Take them up and either serve them whole with a white sauce highly seasoned with cayenne pepper, or mash, season, and add to them some fresh butter. They may, if preferred, be dipped into dissolved butter and placed in an oven until thoroughly hot; serve with beef gravy poured into the dish with them. Tomatoes are frequently sent to table *au naturel*—that is to say, raw and sliced at table.

To Stew Peas.—Put your peas into a stewpan, toss them in a little butter; when hot add sufficient veal or chicken stock to moisten them with; simmer slowly, thicken slightly with flour and butter; place fried sippets round a dish, and serve the peas in the middle.

Dried Peas Stewed.—These may be stewed in meat liquor, allowing a quart of the latter to each half pint of peas; flavor to taste; thicken with yolk of eggs, and add powdered dried mint as for pea-soup; small pieces of broiled bacon may be introduced as a garnish.

Savoys Stuffed.—Choose a freshly-cut medium-sized savoy very firm

and white; remove the outer leaves, and, with a pointed sharp knife, cut out from the root end the whole of the stem and leaf stalks; fill with a rich sausage meat the hollow you have made; put the savoy into a deep stew-pan, keeping the stalk end upwards; pour in with it a good deal of strong gravy; cover it close, and place it for an hour and a half in a moderate oven; reverse the savoy upon a clean dish, and pour round it some of the gravy first strained.

Mashed Turnips.—After being plain boiled, drain, mash them quite smooth, and mix them with any thickened sauce you may fancy; put the whole into a deep dish; add some bits of fresh butter, and bake for a few minutes; or, if you have no oven, stir them in a saucepan over the fire till made perfectly hot.

Radishes Boiled.—These are almost invariably served as a *hors d'œuvre* to eat raw; but they may be well cleaned and nearly all the green leaves trimmed off, and then boiled or stewed; in the first case serve them upon a toast, and when stewed decorate the dish with fried sippets of bread.

Potatoes Mashed.—After boiling, steaming, or baking enough potatoes, mash the pulp free from the skin and make it thoroughly hot in a saucepan, together with seasoning and sufficient butter, cream, white sauce, or milk to moisten it with; or when properly prepared, the mashed potatoes may be put into a deep dish, bake until browned on the top, bread crumbs being strewn upon it or not, according to fancy.

Baked Vegetable Marrow.—Have a medium-sized marrow, halve, peel, and remove the seeds, rub it inside with salt, and let it drain upon a cloth, fill it with any sort of forcemeat you fancy; fasten the halves together; put it into a buttered dish, bake till browned, basting and dredging it with flour; serve in a dish with stewed green peas.

Vegetable Marrow and Cheese.—Plain boil the marrow, and prepare it in the usual way; cut it in small dice, sprinkle rasped Parmesan cheese over the bottom of a dish, place the marrow upon this, strew over it more cheese; mash the whole with a stiff white sauce; sift upon it fine bread crumbs, and bake it for ten minutes in a tolerably brisk oven.

Vegetable marrows are excellent in curry; they make a good preserve, and are converted into pies and puddings in the same way as pumpkins.

Asparagus.—Let the stalks be lightly but well scraped, and as they are done, be thrown into cold water; when all are finished, fasten them into bundles of equal size; put them into boiling water, throw in a handful of salt, boil until the end of the stalk becomes tender, which will be about half an hour; cut a round of bread, and toast it a clear brown, moisten it with the water in which the asparagus was boiled and arrange the stalks with the white ends outwards. A good melted butter must accompany it to table. Asparagus should be dressed as soon after it has been cut as practicable.

French Beans.—When very young the ends and stalks only should be removed, and as they are done, thrown into cold spring water; when to be dressed put them in boiling water which has been salted with a small quantity of common salt; in a quarter of an hour they will be done, the criterion for which is when they become tender; the saucepan should be left uncovered, there should not be too much water, and they should be kept boiling rapidly. When they are at their full growth, the ends and strings should be taken off, and the beans divided lengthways and across, or, according to the present fashion, slit diagonally or aslant. A small piece of soda, a little larger than a small-sized pea, if put into the boiling water with the beans or with any vegetables, will preserve that beautiful green which is so desirable for them to possess when placed upon the table.

French Beans, Salad.—Boil them simply, drain them and let them cool; put them in a dish and garnish with parsley, pimpernel, and tarragon, and dress like other salads.

Stewed Beans.—Boil them in water in which a lump of butter has been placed; preserve them as white as you can; chop a few sweet herbs with

some parsley very fine, then stew them in a pint of the water in which the leaves have been boiled, and to which a quarter of a pint of cream has been added; stew until quite tender, then add the beans, and stew five minutes, thickening with butter and flour.

Parsnips and Carrots.—Wash them, and split them in two—lay them in a stew-pan, with the flat side down, turn on boiling water enough to cover them—boil them till tender, then take them up, and take off the skin and butter them. Many cooks boil them whole, but it is not a good plan, as the outside gets done too much before the inside is cooked sufficiently. Cold boiled parsnips are good cut in slices, and fried brown.

Celeriac.—This is an excellent vegetable, but is little known. The stalks of it can hardly be distinguished from celery, and it is much easier cultivated. The roots are nice boiled tender, cut in thin slices, and put in soup or meat pies; or cooked in the following manner, and eaten with meat. Scrape and cut them in slices. Boil them till very tender—then drain off the water. Sprinkle a little salt over them—turn in milk enough to cover them. When they have stewed about four or five minutes, turn them into a dish, and add a little butter.

Egg Plant.—Boil them a few moments to extract the bitter taste—then cut them in thick slices; sprinkle a little salt between each slice. Let them lie half an hour—then fry them till brown in lard.

Broiled Mushrooms.—Choose them rather large; cut out the stalks and soak the mushrooms in a marinade of olive oil seasoned with a bruised clove of garlic, salt, and pepper; let them stay in this for an hour or so; place them on a gridiron, the stalk side downwards; before they begin to render any juice, turn them; place a small piece of butter in each, and when they look done, carefully, without upsetting them, place them in a dish. Previously to being broiled, they may be dipped into batter and bread crumbs, and a pinch of dried herbs, &c., placed in each.

To Stew Mushrooms White.—Make use of the small button mushrooms for this purpose; rub off their skins and trim them, put them into a stew-pan with milk sufficient to cover them; season; do the whole slowly; thicken with a good piece of butter rolled in a little flour.

Buttered Mushrooms.—Take large button mushrooms, peel them, and cut off the root end of the stalk; put a good deal of butter into a stew-pan, add the mushrooms; season with pepper, salt and beaten mace. Toss them till nicely done; serve all together.

Laitues a L'Espagnole.—Blanch, braise, drain them, and glaze with a meat jelly; arrange them in a circle round the dish, alternating with sippets of toast similarly glazed; add a *sauce Espagnole.*

Stewed Lettuces.—After washing and parboiling the lettuces, slightly toss them in fresh butter, and finish by stewing them gently in thick cream; serve all together.

Lettuce as a Salad, &c.—When required *à la crême*, arrange the white lettuce leaves in a salad bowl, and dress them with good double cream and seasoning. If to be served *aux œufs*, tear up the lettuce leaves; add minced hard-boiled whites of eggs, and the mashed yolks; dress with an ordinary salad mixture.

Slices of anchovy, tunny fish, sardines, flesh of shell fish, turbot, salmon, caviare, white meat of cold poultry, game flesh, cheese, &c., are all suitable additions to lettuces, in salad. *Laitues à la Mayonnaise* are lettuces sent to table with a Mayonnaise sauce instead of an ordinary salad dressing. *Laitues au lard* are lettuces prepared as for a salad in the usual way, but with bacon, tongue, &c., minced and poured over them, hot vinegar being added.

Seakale Boiled.—Clean it thoroughly, tie it in medium-sized bunches, and do it exactly as you would asparagus, only that seakale sometimes requires more than half an hour's boiling. If quite fresh gathered, however, it will be done in twenty minutes; serve it masked with white sauce, or placed simply on a moistened toast, or enveloped in a warm damask napkin.

Salsify or Vegetable Oyster.—The best way to cook it is to parboil it (after scraping off the outside), then cut it in slices, dip it into a beaten egg, and fine bread crumbs, and fry it in lard. It is very good boiled, then stewed a few minutes in milk, with a little butter and salt. Another way which is very good, is to make a batter of wheat flour, milk and eggs; cut the salsify in thin slices, (after having been boiled tender,) put them into the butter with a little salt; drop this mixture into hot fat, by the large spoonful. When a light brown they are cooked sufficiently.

Greens.—White mustard, spinach, water cresses, dandelions, and the leaves and roots of very small beets, are the best greens. Boil them with a little salt and saleratus in the water. If not fresh and plump, soak them in salt and water half an hour before cooking them. When they are boiled enough they will sink to the bottom of the pot.

Artichokes.—Scrape and put them in boiling water, with a tablespoonful of salt to a couple of dozen. When boiled tender, (which will be in about two hours,) take them up, salt and butter each one.

Onions.—Peel and put them in boiling milk, (water will do, but it is not as good). When boiled tender take them up, salt them and turn a little melted butter over them.

Turnips.—White turnips require about as much boiling as potatoes. When tender, take them up, peel and mash them—season them with a little salt and butter. Yellow turnips require about two hours boiling—if very large, split them in two. The tops of white turnips make a good salad.

Salads.—To be in perfection, salads should be fresh gathered, and kept in cold water for an hour before they are put on the table. The water should be drained from them, and if you have not any salad oil, melt a little butter and put it in a separate dish—if turned over the salad, it will not be crispy.

Salad, to Mix.—This is a point of proficiency which it is easy to attain with care. The main point is to incorporate the several articles required for the sauce, and to serve up at a table as fresh as possible. The herbs should be morning-gathered, and they will be much refreshed by laying an hour or two in spring water. Careful picking, and washing and drying in a cloth, requires attention. The sauce may be thus prepared:—Boil two eggs for ten or twelve minutes, and then put them in cold water for a few minutes, so that the yolks may become quite cold and hard; rub them through a coarse sieve with a wooden spoon, and mix them with a tablespoonful of water or cream, and then add two tablespoonfuls of fine flask oil or melted butter; mix, and add by degrees, a teaspoonful of salt and the same quantity of mustard; mix till smooth, then incorporate with the other ingredients about three tablespoonfuls of vinegar; then pour this sauce down the side of the salad bowl, but do not stir up the salad till wanted to be eaten; garnish the top of the salad with the white of the eggs cut in slices, or these may be arranged in such a manner as to be ornamental on the table. Some persons may fancy they are able to prepare a salad without previous instruction, but, like everything else, a little knowledge in this case may not be thrown away.

Artichokes Scolloped.—Cut ready boiled artichokes into small pieces; warm them up in a little white sauce flavored nicely with essence of anchovy and cayenne pepper; place the mixture in shells, sprinkle the tops with fine bread crumbs, and bake until beautifully brown.

Fried Artichokes.—Take boiled artichokes, and when they are grown almost cold, dip them into beaten egg; then roll them in sifted bread crumbs; fry them in plenty of butter till they are of a nice brown; and serve decorated with crisped parsley.

Tossed Artichokes.—After plain boiling them, slice, season, and toss them in a stewpan with some fresh butter.

Water Cresses.—These with us are seldom served otherwise than raw as a relish; they are sometimes used as a sort of salad, garnish to roast

game, poultry, beefsteaks, &c. They are excellent in combination with other salad ingredients.

Stewed Water-cresses.—Pick them over and wash them carefully; blanch them in boiling water, drain and press them, then stew in either gravy or cream, and thicken the sauce with yolks of eggs; garnish the dish with slices of orange.

Tomatoes Roast.—Select them nearly of the same size, take off the stalks, and roast them gently in a Dutch oven; or, if more convenient, place them at the edge of the dripping-pan, taking care that no fat from the joint shall fall upon them, and keeping them turned, that they may be equally done. From ten to fourteen minutes will roast them.

Tomatoes Stewed.—Arrange them in a single layer, and pour to them as much gravy as will reach to half their height; stew them very softly until the under sides are done; then turn, and finish stewing them; thicken the gravy with a little arrowroot and cream, or with flour and butter, and serve it round them.

Tomatoes Forced.—Cut the stem quite close, slice off the tops of eight fine tomatoes, and scoop out the inside; press the pulp through a sieve, and mix with it one ounce of fine crumbs of bread, one of butter broken very small, some pepper, or cayenne, and salt. Fill the tomatoes with the mixture, and bake them for ten minutes in a moderate oven; serve them with brown gravy in a dish. A few small mushrooms stewed tender in a little butter, then mixed and added to the tomatoes' pulp, will very much improve this receipt. Bake for ten minutes.

Stewed Cucumbers.—Peel, slice, and put them into a stewpan with some onion, one anchovy, equal parts of red wine, mushroom ketchup, and gravy; simmer till the anchovy is done to pieces; thicken with butter and flour.

Cucumber, to Dress.—Pare cucumbers, and slice them into a dish as thinly as possible; this is best performed by passing the surface dexterously over the edge of a sharp knife; sprinkle cayenne and salt over them, and leave them to drain for a quarter of an hour; then pour off the water that is thus drawn from them, and dress them with vinegar, oil and pepper. Onions shred finely may be added or not at pleasure.

Fried Cucumbers.—Prepare the cucumbers as for a dish *à la poulette;* drain them after you have plain boiled them, dip the pieces into beaten egg, fry them nicely, and serve with plenty of lemon juice.

Concombres a la Maitre d'Hotel.—Peel and quarter the cucumbers, remove the seeds, cut each quarter in half across; blanch, and afterwards toss the pieces in a mâitre d'hôtel sauce.

Celery Boiled.—Tender young heads of white celery may be trimmed till only about eight inches in length, then put into salted boiling water; and when tender served upon a moistened toast and masked with a good white sauce.

Apple Biscuits.—Boil a dozen fine apples until they become pulpy, then take them out and rub them into a mortar through a hair sieve; add two pounds of powdered loaf sugar, and two or three drops of oil of lemon or cloves; mix thoroughly together, then roll the mixture into separate masses of the size and thickness of a bun, and cut them into any shape desired; they may then be dried in a very slow oven, care being taken that the sugar does not melt.

Apple Bread.—Take a quantity of fresh gathered apples and boil them to a pulp, which mix with double its weight of flour; little or no water is required; yeast is employed in the same proportion as in ordinary bakings, and after being allowed to rise for about ten hours, it is then baked in long loaves. This bread is much eaten in France, and is to be recommended for its light and agreeable properties.

Healthy Mixed Bread.—Boil 3 lbs. of rice to a soft pulp in water; pare and cook by steam 6 lbs. of your best potatoes, mash your potatoes and rub them up with rice pulp; add to the whole 6 lbs. flour; make all into a dough.

with water, ferment with yeast, let it stand a proper length of time, and then place it in the oven to bake.

Aerated Bread, Without Yeast.—1. Dissolve 1 oz. of sesquicarbonate of ammonia in water, sufficient to make 7 lbs. of flour into a dough, which must be formed into loaves, and baked immediately. 2. Divide 3 lbs. flour into two portions; mix up the first with water, holding in solution 2 ozs. bicarbonate of soda; then mix the second portion of flour with water, to which 1 oz. of muriatic acid has been added; knead each mass of the dough thoroughly. When this is done, mix both portions together as rapidly and as perfectly as possible, form the mass into loaves, and bake immediately. This bread contains no yeast, and is very wholesome.

Note.—Bicarbonate of soda and muriatic acid when chemically combined, form common salt.

Brown Bread.—Take equal quantities of Indian meal and rye flour, scald the meal, and when lukewarm add the flour, adding one-half pint of good yeast to four quarts of the mixture, a tablespoon, even full, of salt, and half a cup of molasses, kneading the mixture well. This kind of bread should be softer than wheat flour bread. All the water added after scalding the meal should be lukewarm. When it has risen well, put it to bake in a brick oven or stove—the former should be hotter than for flour bread; if a stove oven, it should be steamed two hours then baked one hour or more; when done it is a dark brown. The best article for baking this kind of bread is brown earthenware—say pans eight or ten inches in height, and diameter about the same; grease or butter the pans; put in the mixture; then dip your hand in cold water and smooth the loaf; after this slash the loaf both ways with a knife, quite deep. Some let it rise a little before they put it to bake. Many people prefer this bread made of one-third rye flour instead of one-half. When it is difficult to get rye, wheat flour will answer as a substitute. It adds very much to the richness and flavor of this kind of bread to let it remain in the oven over night.

Indian Bread,—Beat two eggs very light, mix them with one pint of sour milk (or butter with sweet milk will do), then add a teaspoonful of soda or saleratus; then stir in slowly one pint of Indian meal, and one tablespoonful of melted butter; beat these well together; bake in a common cake-pan in a quick oven. The bread can be made very good without eggs.

Wheat-and-Indian-Bread.—To two quarts of sifted Indian meal add hot water enough to wet the same; when sufficiently cooled, add one teaspoonful or more of salt, half a pint of yeast and one-half teaspoonful of molasses; then add wheat flour enough to make it into loaves; (it should be kneaded well,) and when risen light, bake or steam it three or more hours; if this should get sour while rising, add a teaspoonful of sugar and a little saleratus, dissolved in water.

Potato Bread.—Boil the potatoes very soft, then peel and mash them fine. Put in salt, and very little butter—then rub them with the flour—wet the flour with lukewarm water—then work in the yeast, and flour till stiff to mould up. It will rise quicker than common wheat bread, and should be baked as soon as risen, as it turns sour very soon. The potatoes that the bread is made of should be mealy, and mixed with the flour in the proportion of one third of potatoes to two-thirds of flour.

Rye and Indian Bread.—Two quarts rye meal, two quarts Indian meal, one teacup molasses, one teacup yeast, two teaspoons salt. Mix with warm water, soft so as to run into a pan; let it rise three hours; stir in one teaspoon dissolved saleratus. Steam or bake four or five hours.

Corn Bread.—Take two quarts of milk, five eggs, half ounce salt, one teaspoonful saleratus, one tablespoonful of cream tartar, two ounces butter, and take Indian meal sufficient to make a thick batter; put into pans well greased, and then bake in a quick oven.

French Bread.—Take nice rice, ¾ lb.; tie it up in a thick linen bag giving enough room for it to swell; boil from three to four hours till it becomes

a perfect paste; mix while warm with 7 lbs. flour; adding the usual quantities of yeast, salt, and water. Allow the dough to work a proper time near the fire, then divide into loaves, dust them in, and knead vigorously. This quantity will make 13 lbs. 7 oz. of very nutritious bread.

How To Know Good Flour.—When flour is genuine or of the best kind, it holds together in a mass when squeezed by the hand, and shows the impressions of the fingers, and even of the marks of the skin much longer than when it is bad or adulterated; and the dough made with it is very gluey, ductile, and elastic, easy to be kneaded; and may be elongated, flattened, and drawn in every direction without breaking.

Dyspepsia Bread.—The following receipt for making bread has proved highly salutary to persons afflicted with dyspepsia, viz:—3 quarts unbolted wheat meal; 1 quart soft water, warm but not hot; 1 gill of fresh yeast; 1 gill molasses, or not, as may suit the taste; 1 teaspoonful of saleratus.

Corn-meal bread No. 1.—Take 2 qts. of corn meal with about a pint of (thin) bread sponge, and water enough to wet it; mix in about half a pint of wheat flour, and a tablespoonful of salt; let it rise, and then knead well the second time; bake 1½ hours.

Corn-meal Bread No. 2.—Mix 2 qts. of new corn-meal with three pints of warm water; add 1 tablespoonful of salt, 2 tablespoonfuls of sugar, and 1 large tablespoonful of hop yeast; let it stand in a warm place five hours to rise; then add 1½ teacupful of wheat flour, and half a pint of warm water. Let it rise again 1½ hours, then pour it into a pan well greased with sweet lard and let it rise a few minutes. Then bake, in a moderately hot oven, 1 hour and 30 minutes.

Sponge Bread.—For four loaves of bread, take three quarts of wheat flour and the same quantity of boiling water—mix them well together. Let it remain till lukewarm, then add a tea-cup full of family, or half a tea-cup of distillery yeast. Set it in a warm place to rise. When light, knead in flour till stiff enough to mould up, then let it stand till risen again before moulding it up.

Making Yeast and Bread.—The best results can be obtained from the following *modus operandi*. First get a package of yeast cakes—any of the different kinds are good provided they are fresh—grate in a pan one coffee-cupful of potato, add one coffeecupful of sugar, one half cupful of salt, one level teaspoonful of ginger, and three quarts of boiling water; set on the stove, stir constantly, and after boiling ten minutes, remove. When lukewarm, add two yeast cakes previously soaked in warm water, and set in a warm place to ferment. If made early in the morning, at night it will be ready to put in a clean, sweet jug, loosely corked; after standing 24 hours, cork tightly, and in 24 hours more it will be ready for use. Before this is gone, make new again, adding two cups of the old to raise it with, and about every other time an additional yeast cake.

After tea,at night—earlier in cold and later in warm weather—sift your flour,and to one coffeecupful of mashed potato,(we usually have them,either for breakfast or dinner, a good share of the year, and I cook enough for my bread,) add one quart of hot water, stirring to remove all lumps; then add one pint of fresh, cold, sweet milk, put into your flour and stir, adding one coffee-cupful of the above yeast; then mix thoroughly into a mass,care being taken against getting it too stiff—but this is one of the things that cannot be described, but must be learned by experience. Cover the top with a little flour, and set in a warm place to rise.

Early in the morning mix thoroughly again, and again set in a warm place to rise. When sufficiently light, mould lightly into loaves. Now have your oven heated, as it rises quickly this time, and very much depends on the way you bake it. When even with the top of your tins, put in a hot oven. If it be so hot that in ten minutes your bread has commenced to slightly brown, you may be sure of fine-grained, moist, spongy bread; but if the oven is cool,the gas will escape,and your bread be coarse-grained and dry. After fifteen or twenty minutes, let your oven gradu-

ally cool down. If you burn good hard wood, this can be easily regulated; but with coal, it is far more difficult, but can be done. If your loaves are of small or medium size, forty-five or fifty minutes will bake them; if large, a longer time will be required. After taking them out of the oven, wrap them in a damp towel, and lay on their sides.

Perhaps some may object to this plan as requiring too much labor but good white bread cannot be made without thorough mixing and attendance on the details; for in making bread, as in everything else, the *little things* determine the difference between good and bad. With good white and brown bread, sweet butter, and plenty of canned fruit, no housewife need fear the unexpected visitor.

New Method of Making Bread.—Tie up one pound and a half of the best American rice in a thick linen bag, allowing ample room to swell; boil it three or four hours until it becomes a smooth paste; mix this while warm with fourteen pounds of the best flour, adding the usual quantities of yeast and salt; allow the dough to work a certain time near the fire, after which divide it into loaves. The flour should be dusted in and most vigorously kneaded. This quantity of flour and rice has produced twenty-six pounds thirteen ounces of this excellent bread, which kept moist and sweet longer than that made by the ordinary process. *This is the new French method.*

Hop Yeast.—Boil 5 gals. water and 10 ounces hops together from 10 to 15 minutes; put 6 lbs. flour in a tub, to which add as much of the boiling liquor as will be necessary to make a thick paste. When the remainder of the liquor is perfectly cool, add it, together with 1 gal. of stock yeast, to the paste, when the whole will be ready for use.

Excellent Rolls.—Warm one ounce of butter in half a pint of milk; put to it a spoonful and a half of yeast of small beer, and a little salt. Put two pounds of flour into a pan, and mix in the above. Let it rise an hour; knead it well; make into seven rolls, and bake in a quick oven.

If made in cakes three inches thick, sliced and buttered, they resemble Sally Lunns.

French Rolls.—One quart milk, one cup butter, two eggs, flour enough to knead. Let the dough rise *twice* in the dish, that is, after it rises once take it out, knead it over, let it rise again; after this roll it out, cut it out with a tumbler, double up roll fashion, and let them remain in the pan half an hour before baking.

Delicate Breakfast Rolls.—Take one quart sifted flour,one measure Horsford's Preparation, one teaspoonful salt, three and a half gills water; drop with spoon into the "Gem" baking pans. Before mixing the above, set the "Gem" pan on the stove, butter it and let it get very hot before filling, so that the rolls will begin to bake as soon as they touch the pan.

Graham Rolls.—As Graham flour cannot be sifted, take 1 ½ pints of Graham flour, 1 measure Horsford's Preparation. Roll the acid and soda separately, to free it from lumps, and with a spoon, mix each one thoroughly with the dry flour. Add one teaspoonful salt. To one pint of water, add half gill of molasses,with which wet the flour. A well-beaten egg improves these rolls. Bake like white rolls in "Gem" pans.

Dutch Rusks.—Take three pounds of flour, half a pound of butter, a quarter of a pound of sugar; mix half a pint of new milk with a quarter of a pint of yeast; rub the flour, butter, and sugar together; set sponge with the milk; when risen, work up the dough, and make it into small balls; bake on tins in a moderate oven for a quarter of an hour; next day cut them in two, and dry them in the oven.

Rolls.—Rub into a pound of flour half a teacupful of butter; add half a teacup of sweet yeast, a little salt, and sufficient warm milk to make a stiff dough, cover and put it where it will be kept warm, and it will rise in two hours. Then make into rolls or round cakes. They will bake in a quick oven in fifteen minutes.

Biscuit.—Take one quart sifted flour (loosely put in), one "measure"

Horsford's Bread Preparation, one teaspoonful of salt, three gills of water. Shape with a spoon and the floured hand.

Buttered Biscuits.—Rub one pound of butter into seven pounds of flour; wet up with one quart of warm water and half a pint of good yeast; break down smooth; prove your dough well, and bake in a strong heat.

Brighton Biscuits.—Take one pound and a quarter of good moist sugar, and roll it fine; pass it through a sieve with two pounds and a half of flour; rub in two ounces of butter; make a hole in the middle, strew a few carraway-seeds, pour in half a pint of honey water, and a quarter of a pint of milk; beat it well with your hand till about half the flour is incorporated, then mix it together; roll it out in thin sheets; cut them out and place them on your buttered tins about two inches apart; wash with a little beer, and bake them in a good steady heat.

Ribbon Biscuit.—Take two and a quarter pounds of flour, half a pound of butter, one pound white sugar, three eggs, half a gill of milk; flavor with a little mace and oil of lemon; make dough and put them through the pastry syringe; then cut them in any shape fancy dictates. Bake them in a moderate oven.

Egg Biscuit.—Take eight pounds of flour, one pound of butter, mix the butter and flour together, and then take one pound and a quarter white sugar, and take twenty eggs to make dough, and then roll the paste out to the eighth of an inch in thickness, dot the sheet all over and then cut with a cutter the shape of an oak leaf; then have a pot of boiling water and a pot of cold water, and let them remain in the boiling water until they come to the surface; then take them out and put them into the cold water till they are properly cold, and take them out of the cold water and put them on tin pans, and bake them in a moderate oven. An invaluable and nutritious article for consumptives or invalids of any description.

French Tea Biscuits.—Two pounds flour, two ounces butter, one-half pint milk, one egg, one-half cup sugar, one cup yeast.

Shortened Biscuit.—To judge by the frequency of their appearance at most tables, no bread is more popular, yet none more easily or commonly spoiled by the carelessness of cooks, than biscuit. The rule for soda is to put only one teaspoonful to a gallon of flour; hence, the small pinch required for the quart needed in a small family may be easily calculated. Soda should always be combined with some acid, so that if you have no sour milk with which to make up your dough, use a little tartaric acid, or even vinegar, to produce the desired fermentation. To one quart of flour a small tablespoonful of lard and a lump of butter the size of a hen's egg are sufficient shortening to allow. If you make up your soda biscuit with buttermilk instead of water, even a smaller quantity will suffice. Biscuit to be good should be baked in a quick, well regulated oven, and be nicely browned. A teaspoonful of salt allow to a quart of flour.

Travellers' Biscuit.—2 lbs. of flour, ¾ of a pound of sugar, ¼ pound of butter, one teaspoonful of *dissolved* saleratus, milk sufficient to form a dough. Cut up the butter in the flour, add the sugar, and put in the saleratus and milk together, so as to form dough. Knead it till it becomes perfectly smooth and light. Roll it in sheets about ⅛ of an inch thick, cut the cakes with a cutter or the top of a tumbler. Bake in a moderate oven.

Volatile Biscuits.—Mix one pound of flour, half a pound of loaf sugar, and a quarter of a pound of butter into a paste, with two eggs and a teaspoonful of carbonate of ammonia dissolved in a little milk.

Yorkshire Biscuits.—Mix a small teaspoonful of bi-carbonate of soda and a very little salt with a pound of flour; rub in a quarter of a pound of butter; add one egg, well beaten, and as much buttermilk as will render the mass of a stiff paste; knead till quite smooth; roll it, cut out the biscuits; prick them, and bake immediately in a moderately hot oven.

Sponge Biscuit.—Stir into a pint of lukewarm milk half a tea-cup of melted butter, a teaspoonful of salt, half a tea-cup of family, or a table-

spoonful of brewers' yeast, (the latter is the best;) add flour till it is a very stiff batter. When light, drop this mixture by the large spoonful on to flat buttered tins, several inches apart. Let them remain a few minutes before baking. Bake them in a quick oven till they are a light brown.

ABERNETHY BISCUIT.—Take eight pounds of flour, 1½ lb. of butter, 1 quart of sweet milk, 12 ounces of sugar, 1 ounce of caraway seeds, 6 eggs; mix dough of the above, break them in pieces of about two ounces, mould them off, roll them out, prick them, and bake them in a moderate oven.

HARD BISCUIT.—Weigh out four pounds of flour, and rub three pounds and a half of it with four ounces of butter; four beaten eggs, and a couple of teaspoonfuls of salt. Moisten it with milk, pound it out thin with a rolling-pin, sprinkle a little of the reserved flour over it lightly—roll it up and pound it out again, sprinkle on more of the flour—this operation continue to repeat till you get in all the reserved flour—then roll it out thin, cut it into cakes with a tumbler, lay them on flat buttered tins, cover them with a damp cloth, to prevent their drying. Bake them in a quick oven.

SAVOY BISCUIT.—Take of sugar the weight of 14 eggs, of flour the weight of 6 eggs, beat the yolks and whites of 12 eggs, separate, grate in the rind of a lemon; after being in the oven a few minutes grate on some sugar. You may add peach-water, or lemon juice, or any flavoring extract.

LEMON BISCUIT.—Take 3½ lbs. white sugar, 4 lbs. flour, ½ ounce saleratus, ½ lb. suet, a little milk to wet the dough, cut them out about the size of marbles, put them on pans a little greased, and bake them in a hot oven and flavor them with essence of lemon.

SALERATUS BISCUIT.—Put a couple of teaspoonfuls of saleratus in a pint of sour milk. If you have not any sour milk, put a tablespoonful of vinegar to a pint of sweet milk, set it in a warm place—as soon as it curdles, mix it with the saleratus—put in a couple of tablespoonfuls of melted butter, and flour to make them sufficiently stiff to roll out. Mould them up into small biscuits, and bake them immediately.

YORK BISCUIT.—3 lbs. flour, ½ lb. butter, ¾ lbs. sugar; wet up, and raise with sour milk and saleratus.

BUTTER-MILK BISCUIT.—Dissolve a couple of teaspoonfuls of saleratus in a teacup of sour milk—mix it with a pint of buttermilk, and a couple of teaspoonfuls of salt. Stir in flour until stiff enough to mould up. Mould it up into small cakes, and bake them immediately.

No. 1 CRACKERS.—Butter, 1 cup; salt, 1 teaspoonful; flour, 2 qts. Rub thoroughly together with the hand, and wet up with water; beat well, and beat in flour to make quite brittle and hard; then pinch off pieces and roll out each cracker by itself.

HARD CRACKERS.—Warm two ounces of butter in as much skimmed milk as will make a pound of flour into a very stiff paste; beat it with a rolling-pin, and work it very smooth. Roll it thin, and cut it into round biscuits; prick them full of holes with a fork. About six minutes will bake them.

SUGAR CRACKERS.—Flour, 4 lbs; loaf sugar and butter, of each ½ lb; water, 1½ pts; make as above.

CRACKERS.—Rub six ounces of butter with two pounds of flour—dissolve a couple of teaspoonfuls of saleratus in a wineglass of milk, and strain it on to the flour— add a teaspoonful of salt, and milk enough to enable you to roll it out. Beat it with a rolling-pin for half an hour, pounding it out thin—cut it into cakes with a tumbler—bake them about fifteen minutes, then take them from the oven. When the rest of your things are baked sufficiently, take them out, set in the crackers, and let them remain till baked hard and crispy.

SODA CRACKERS.—Seven teacups flour, one-half tea-cup butter, two teaspoonfuls cream tartar, one teaspoonful soda; rub them thoroughly into the flour; add one and a half cups of water; work thoroughly; pound the dough till it snaps. Bake quickly.

RICE PANCAKES.—To half a pound of rice put two-thirds of a pint of wa-

ter, boil it to a jelly ; when cold, add to it eight eggs, a pint of cream, a little salt and nutmeg, and a half a pound of butter melted ; mix well, adding the butter last, and working it only so much as will make the batter sufficiently thick. Fry them in lard, but employ as little as it is possible to fry them with.

Fritters.—Are made of batter the same as pancakes. Drop a small quantity into the pan, have ready apples pared, sliced, and cored, lay them in the batter and fry them ; they may also be made with sliced lemon or currants ; the latter is particularly palatable. They should be sent to table upon a folded napkin in the dish ; any sweetmeat or ripe fruit will make fritters.

Oyster Patties.—Put fine puff-paste into small patty-pans and cover them with paste, with a bit of bread in each ; bake them and by the time they are done have ready the following, to fill them with on taking out the bread :—Take off the beards of the oysters, cut the other parts into small bits, put them into a small tosser with a little nutmeg, a very little white pepper and salt, a shred of lemon-peel cut exceedingly small, a very little cream, and a small portion of the oyster liquor. Simmer this for a few minutes, then fill the patty pans and serve.

Cream Fritters.—Mix a pint and a half of wheat flour with a pint of milk—beat six eggs to a froth, and stir them into the flour—grate in half a nutmeg, then add a pint of cream, a couple of teaspoonfuls of salt. Stir the whole just long enough to have the cream get well mixed in, then fry the mixture in small cakes.

Gooseberry Fritters.—Make a thick batter, composed of six eggs well beaten, three-quarters of a pint of cream, a tablespoonful of yeast, a tablespoonful of orange-flower water, and a little grated nutmeg, adding as much flour as may be necessary to produce the proper consistence. Stew some gooseberries till quite tender ; mix them with the batter ; drop it into boiling lard, and fry to a good color. Strew sugar over them and serve.

Cream Pancakes.—Mix two eggs, well beaten, with a pint of cream, two ounces of sifted sugar, six ounces of flour, a teaspoonful mixed of cinnamon, nutmeg, and mace. Fry the pancakes thin with a piece of butter.

Indian Muffins.—One quart of Indian meal, one quart of wheat flour, eight eggs, two gills of yeast, a little salt, as much warm milk as will make the whole into a thick batter, mix the Indian and wheat flour together, stir in the milk, then the yeast, and lastly the eggs ; after they have been well beaten : when the batter is light, grease the griddle and muffin rings, place the rings on the griddle, pour in the batter, bake them brown on both sides and serve hot. If for breakfast, set to rise the night previous ; if for tea, about 1 o'clock.

Muffins.—One quart flour, prepared as above, one egg, one pint milk or water, so as to make a thick smooth batter ; bake in muffin rings. (If rich food is desired, add more eggs.)

Rice Muffins.—One pint of rice, one cupful of milk, three eggs, and as much flour as will make a batter the consistence of pound-cake batter.

Pancakes.—Beat up three eggs and a quart of milk ; make it up into a batter with flour, a little salt, a spoonful of ground ginger, and a little grated lemon-peel ; let it be of a fine thickness and perfectly smooth. Clean your frying-pan thoroughly, and put into it a good lump of dripping or butter. When it is hot, pour in a cupful of batter, and let it run all over of an equal thickness. Shake the pan frequently, that the batter may not stick : and when you think it is done on one side, toss it over ; if you cannot, turn it with a slice ; and when both are of a nice light brown, lay it on a dish before the fire ; strew sugar over it, and so do the rest. They should be eaten directly, or they will become heavy.

Muffins.—A quart of milk, 2 eggs, 2 spoonfuls of yeast, 2 lbs. of flour, a lump of butter size of an egg—which is to be melted in the milk—and a little salt ; the milk is to be warmed, and the ingredients added. Let it rise, and then turn the mixture into buttered pans, and bake to a light brown.

Corn Griddle Cakes with Yeast.—Three coffeecups sifted Indian meal, one coffeecup flour, two tablespoons yeast, one saltspoon salt. Wet at night with water as thick as pancakes. In the morning add one teaspoon soda dissolved.

Flapjacks.—One quart of milk, four eggs, two tablespoons rye meal, two tablespoons yeast.

Butter Cakes for Tea.—Beat two eggs, put them in half pint of milk and a teacup of cream, with half a teaspoonful of saleratus dissolved in the cream, a little salt, cinnamon and rose-water if you like, stir in sifted flour till the batter is smooth and thick. Bake them on a griddle or in a pan. Butter the pan well; drop the batter in small round cakes and quite thin; they must be turned and nicely browned. Lay them on a plate with a little butter between each layer.

Apple Fritters.—Peel, core, and slice one dozen fine apples, put them into a basin, and add a wineglassful of brandy and six drops of essence of lemon; let them remain in this for some hours before use. When required take them out and strew them lightly in a frying pan prepared with heated lard; fry them until they are of a light brown color, lay them on writing paper to drain, dust with powdered loaf sugar and then serve.

Apple Fritters.—This is a favorite dish with many, and often preferred to dumplings. We like them prepared thus: Make a batter, not very stiff, with one quart of milk, three eggs, and flour to bring it to a right consistence. Pare and core a dozen large apples, and chop them to about the size of small peas, and mix them well in the batter. Fry them in lard, as you would doughnuts. For trimmings, we like powdered white sugar best, though good molasses answers very well; they are good with either.

Bread Fritters.—Strew half a pound of currants on a dish, and dredge them well with flour; grate some bread into a pan until a pint of crumbs is produced; pour over them a pint of boiling milk, in which two ounces of butter have been stirred; cover the pan, and let it stand for an hour. Then beat the mixture thoroughly, and add half a nutmeg grated; a quarter of a pound of white powdered sugar, and a wineglassful of brandy. Beat six eggs till very light, and stir them by degrees into the mixture. Lastly add the currants, a few at a time, and mix the whole thoroughly. It should be brought to the consistence of a thin batter, and if it turns out too thin, add a little flour. Have ready over the fire a heated frying-pan with boiling lard. Put in the batter in large spoonfuls, and fry the fritters to a light brown. Drain them on a perforated skimmer, or an inverted sieve, placed in a deep pan, and send them to table hot. Serve with wine and powdered sugar.

Indian Slap Jacks.—Scald a quart of Indian meal—when lukewarm, turn, stir in half a pint of flour, half a teacup of yeast, and a little salt. When light, fry them in just fat enough to prevent their sticking to the frying pan. Another method of making them, which is very nice, is to turn boiling milk or water on to the Indian meal, in the proportion of a quart of the former to a pint of the latter—stir in three tablespoonfuls of flour, three eggs well beaten, and a couple of teaspoonfuls of salt.

Crumpets.—Take three teacups of raised dough and work into it, with the hand, half a teacup of melted butter, three eggs, and milk to render it a thick batter. Turn it into a buttered bake-pan—let it remain fifteen minutes, then put on a bake-pan, heated so as to scorch flour. It will bake in half an hour.

Rice Waffles.—Take a teacup and a half of boiled rice; warm it with a pint of milk, mix it smooth; then take it from the fire, stir in a pint of cold milk, and a teaspoonful of salt. Beat four eggs, and stir them in together with sufficient flour to make a thick batter.

Quick Waffles.—Mix flour and cold milk together, to make a thick batter. To a quart of the flour put six beaten eggs, tablespoonful of melted butter, and a teaspoonful of salt. Some cooks add a quarter of a pound of sugar, and half a nutmeg. Bake them immediately.

Breakfast Butter Cakes.—One quart of sour milk, one teaspoonful saleratus, a little salt, one and a half cup sugar, a little ginger, and flour enough to make a stiff batter.

Buckwheat Cakes.—Take one quart of buckwheat meal, half a cup of new yeast, a tea-spoonful of saleratus, a little salt and sufficient new milk or cold water to make a thick batter. Put it in a warm place to rise. When it has risen sufficiently, bake it on a griddle; must be well buttered, and the cakes are better to be small and thin.

Buckwheats with Yeast.—One quart buckwheat flour, one teaspoon salt. Stir in warm water to make a thin batter; beat throughly; four tablespoons home-brewed yeast. Set the batter in a warm place. Let it rise over night. Add one teaspoon soda in the morning; two tablespoons molasses.

Buckwheat Cakes without Yeast.—One quart buckwheat, one small cup Indian meal, one teaspoon soda, dissolved in water enough to make a batter, two teaspoons cream-tartar. Bake on a griddle. Yeast buckwheats are best.

Potato Fritters.—Boil two large potatoes, scrape them fine; beat four yolks and three whites of eggs, and add to the above one large spoonful of cream, another of sweet wine, a squeeze of lemon and a little nutmeg. Beat this batter half an hour at least: will be extremely light.

Venetian Fritters.—Wash and drain three ounces of whole rice, put it into a full pint of cold milk, and bring it very slowly to boil; stir it often and let it simmer gently until it is quite thick and dry. When about three parts done, add to it two ounces of pounded sugar, and one of fresh butter; a grain of salt, and the grated rind of half a small lemon; let it cool in the saucepan, and when only just warm, mix with it thoroughly three ounces of currants, four of apples, chopped fine, a teaspoonful of flour and three large, or four small, well beaten eggs; drop the mixture in small fritters; fry them in butter, from five to seven minutes, and let them become quite firm on one side before they are turned; do this with a slice, drain them as they are taken up, and sift white sugar over them after they are dished.

Whole rice, three ounces; milk, one pint; sugar, two ounces; butter, one ounce; grated rind of one-half a lemon; currants, three ounces; minced apples, four ounces; flour, one teaspoonful; a little salt; eggs, three large or four small.

Plain Indian Cakes.—Take a quart of sifted Indian meal, sprinkle a little salt over it, mix it with scalding water, stirring; bake on a tin stove oven. Indian cake is made with buttermilk, or sour milk, with a little cream or butter rubbed into the meal, and a teaspoonful of saleratus.

Best New-England Johnny-Cake.—Take one quart of buttermilk, one teacup of flour, two-thirds of a teacupful of molasses, a little salt, one teaspoonful of saleratus, one egg (beat of course); then stir in Indian meal, but be sure and not put in too much. Leave it thin, so that it will almost run. Bake in a tin in any oven, and tolerably quick. If it is not first rate and light, it will be because you make it too thick with Indian meal. Some prefer it without the molasses.

Green Corn Cake.—Mix a pint of grated green corn with three tablespoonfuls of milk, a teacup of flour, half a teacup of melted butter, one egg, a teaspoonful of salt, and half a teaspoonful of pepper. Drop this mixture into hot butter by the spoonful, let the cakes fry eight or ten minutes. These cakes are nice served up with meat for dinner.

Cheesecake.—Beat eight eggs thoroughly while a quart of milk is boiling, and when it boils, put in the eggs and stir them till they come to a curd; then pour it out, and when it is cold, add a saltspoonful of salt, two teaspoonfuls of rose-water, and three-quarters of a pound of currants well washed; put it into a puff paste and bake it. If tin patties are used for baking, they must be buttered; but if they are baked in glass or china, only an upper crust will be necessary.

Cheese Potted.—Add to a pound of grated Cheshire cheese, three

ounces of fresh butter, half a tablespoonful of sifted mace, and a teaspoonful of mustard. Mix all thoroughly in a marble mortar, put it into small pots, cover it with clarified butter, and set the pots in a cold, dry place.

Cheese Toasted.—This preparation is popularly known as *Welsh rabbit* or *rarebit*. Cut some double or single Gloucester cheese into thin shavings, and put it with a bit of butter into a cheese-toaster; place it before the fire until the cheese dissolves, stirring it occasionally. Serve with a slice of toasted bread divided into four, and the crust pared off. It is generally eaten with mustard, salt, and pepper.

Cheesecake Bread.—Slice a half-quartern loaf as thin as possible, pour on it a pint of boiling cream, let it stand for two hours; then take eight eggs, half a pound of butter, and a nutmeg grated, beat them well together, add half a pound of currants, and bake in patty-pans.

Cheese Sandwiches.—Take two parts of grated Parmesan or Cheshire cheese, one of butter, and a small proportion of made mustard; pound them in a mortar; cover slices of bread with a little of this, and lay over it slices of ham or any cured meat; cover with another slice of bread, press them together, and cut into mouthfuls that they may be lifted with a fork.

Almond Cheesecake.—Take three or four bitter, and one ounce of sweet almonds; boil and skin them; put them into a mortar with two ounces of loaf sugar, and the yolks of two eggs; pound them fine; then rub two ounces of butter to a cream, and mix all together; put puff paste in the patties; fill it three parts full with the batter; lay a few cut almonds over the top; sugar over, and bake them in a steady oven.

Common Cheesecakes.—Take four ounces of butter, beat it with a wooden spoon in a warm pan or basin till it comes to a fine cream; then add four ounces of powdered sugar, beat it well; add the yolk of one egg; beat again, then add one whole egg; beat all well together, and mix in four ounces of clean currants; lay your puff paste in the patties, fill them half full; shake a little sugar over, and bake them in a good heat.

Curd Cheesecakes.—Warm one pint of new milk; stir in a bit of rennet, keep it warm till a nice curd appears, break it to pieces, and strain the whey through a hair sieve; then having your mixture prepared as for common cheesecakes, but without any currants, put it into the sieve with the curd, and rub it all through together; then mix in your currants, fill them out; bake them as in the last receipt.

A Good Pound Cake.—Beat a pound of butter to a cream, and mix with it the whites and yolks of eight eggs beaten apart. Have ready, warm by the fire, a pound of flour, and the same of sifted sugar, mix them, and a few cloves, a little nutmeg and cinnamon in fine powder together; then by degrees work the dry ingredients into the butter and eggs. When well beaten, add a glass of wine and some caraways. It must be beaten a full hour. Butter a pan, and bake it a full hour in a quick oven.

The above proportions, leaving out four ounces of the butter, and the same of sugar, make a less luscious cake, and to most tastes a more pleasant one.

Pound Cake.—Mix a pound of sugar with three-quarters of a pound of butter. When worked white, stir in the yolks of eight eggs, beaten to a froth, then the whites. Add a pound of sifted flour and mace or nutmeg to the taste. If you wish to have your cake particularly nice, stir in, just before you put it into the pans, a quarter of a pound of citron, or almonds blanched and powdered fine in rosewater.

Half-Pound Cake.—One pound of sugar, one pound of flour, one-half pound of butter, eight eggs; dissolve one teaspoon of saleratus in the juice of a lemon.

French Cake.—One pound of sugar, three-quarters of a pound of butter, a pound and a half of flour, twelve eggs, a gill each of wine, brandy, and of milk. Mix the sugar and butter together—when white, add the eggs, beaten to a froth, (the whites and yolks should be separated)—then

stir in the flour, the milk and wine, and one-fourth of a grated nutmeg. Just before it is baked, add three-quarters of a pound of seeded raisins, a quarter of a pound of citron, and a quarter of a pound of almonds, blanched and pounded fine.

Apple Cake.—Peel and core eight or ten good sized apples, add the peel of one lemon and half a stick of cinnamon. Make them into a marmalade with a half pint of water; boil the whole with one pound of loaf sugar, and keep stirring until it falls in masses from the spoon, when it will be done. Turn it out when cold into moulds or dishes, and add cream or custard.

Centennial Cake.—Rub two pounds of dry fine flour, with one of butter, mix it with three spoonfuls of yeast in a little warm milk and water. Set it to rise an hour and a half before the fire; then beat into it two pounds of currants, one pound of sugar sifted, four ounces of almonds, six ounces of stoned raisins, chopped fine, half a nutmeg, cinnamon, allspice, and a few cloves, the peel of a lemon chopped as fine as possible, twelve yolks and whites of eggs, beat separately and long. Beat exceedingly well, and butter the pan. A quick oven.

Light Tea Cake.—One cup sugar, two eggs, one-half cup melted butter, one and one-fourth cup of milk, two teaspoons cream-tartar, one teaspoon soda, flour to make a stiff batter. It will bake in twenty minutes if the oven is hot.

Mountain Cake.—1 cup of sugar, 2 eggs, half cup of butter, half cup of milk or water, 2 cups of flour, teaspoonful of cream of tartar, half a teaspoonful of soda, nutmeg.

Corn Starch Cake.—½ lb. of sugar, 4 oz. of butter, 5 eggs, 1 teaspoonful cream of tartar, ½ teaspoonful soda, ½ lb. of corn starch, ½ a gill of sweet milk

Poor Man's Cake.—1 cup of sugar, ½ cup of butter, 1 cup sour cream, 1 egg, flour enough to make a good batter, ½ a teaspoonful of saleratus.

Cup Cake.—Mix three tea-cups of sugar with one and a half of butter. When white, beat three eggs, and stir them into the butter and sugar, together with three tea-cups of sifted flour, and rosewater or essence of lemon to the taste. Dissolve a teaspoonful of saleratus in a tea-cup of milk, strain it into the cake, then add three more tea-cups of sifted flour. Bake the cake immediately, either in cups or pans.

Scotch Cake.—Stir to a cream a pound of sugar, and three-quarters of a pound of butter—put in the juice and grated rind of a lemon, a wine glass of brandy. Separate the whites and yolks of nine eggs, beat them to a froth, and stir them into the cake—then add a pound of sifted flour, and just before it is put in the cake pans, a pound of seeded raisins.

Spice Cake.—One cup sour milk, one cup sugar, half cup butter, one cup raisins, two and a half cups flour, one egg, one teaspoon soda.

Buttermilk Cake.—One cup butter, two cups buttermilk, three cups sugar, four eggs, five cups flour, soda enough to sweeten the buttermilk.

Loaf Cake.—Three cups of yeast, three and a half cups of sugar, two cups of butter, one cup of sour milk, four eggs; stir the butter, sugar, and eggs together; two teaspoons of soda, nutmeg, cinnamon, and raisins.

Silver Cake.—Two cups flour, one and one-half cups sugar, one-half cup sweet milk, half cup butter, whites of four eggs, one teaspoon cream tartar, *scant*, one-half teaspoon soda, *scant;* spice with vanilla; bake in a slow oven.

Gold Cake.—One cup butter, two cups sugar, three cups flour, one-half cup sweet milk, yolks of six eggs and one whole egg, one teaspoon cream-tartar, one-half teaspoon soda; flavor with lemon. Use the two whites left for frosting.

Marble Cake. *For the white cake.*—One cup butter, three cups white sugar, five cups flour even full, one-half cup sweet milk, one-half teaspoon soda, whites of eight eggs; flavor with lemon.

Marble Cake. *For the dark cake.*—One cup butter, two cups brown sugar, one cup molasses, one cup sour milk, one teaspoon soda, four cups

flour, yolks of eight eggs, and one whole egg; spices of all sorts. Put in pans first a layer of dark cake, then a layer of the white, and so on, finishing with a layer of dark cake. Bake in a hot oven.

CIDER SPICED CAKE.—One-half cup butter, one cup and one-half sugar, one cup cider, one egg, two teaspoons of cinnamon, two of cloves, half a nutmeg, one teaspoon soda, flour enough to make a stiff batter.

ONE-EGG CAKE.—One and a half cup sugar, one egg, three cups flour, one cup milk, piece butter size of an egg, one even teaspoon cream tartar, one-half teaspoon soda. Lemon to taste.

LUNCHEON CAKE.—One pound flour, one-half pound raisins, chopped, one-half pound sugar, one-half pound butter; two eggs, one-half pint molasses, dark spices, one-half teaspoon soda, dissolved in a teacup of warm milk.

COFFEE CAKE WITHOUT EGGS.—One cup and a half of cold coffee, one cup and a half of sugar, half a cup of molasses, nearly one cup of butter, one cup of chopped raisins mixed with flour, one cup of currants, one teaspoonful of saleratus, little over; one wineglass of wine or brandy, little citron, one nutmeg, cloves, cinnamon and spice; stir with flour as stiff as fruit cake.

MEASURE CAKE.—Six cups sugar, eight eggs, three cups butter, two teaspoons cream-tartar, two cups milk, one teaspoon soda, ten cups flour, raisins and spices to taste.

LOAF CAKE.—Take 2 lbs. of flour, ½ lb. of sugar, ¼ lb. of butter, 3 eggs, 1 gill of milk, ½ teacupful of sweet yeast, cloves and nutmeg for spice.

DELICATE CAKE.—One coffee cup of sugar, one coffee cup of flour, one-half cup of butter, whites of four eggs; grate the rind of a lemon.

SEED CAKE.—Four cups of flour, one and a half cup of cream or milk, half a cup of butter, three eggs, half a teacupful of caraway seeds, a teaspoonful of saleratus, the same of rosewater; make it into a stiff paste, and cut them out with a tumbler or biscuit-cutter; bake about twenty minutes.

PUFF CAKE.—Two cups sugar, three cups flour, one cup butter, three eggs, one cup milk, one teaspoon soda, two teaspoons cream-tartar.

CLOVE CAKE.—One pound flour, one pound sugar, one-half pound butter, one pound raisins, four eggs, teacup sweet milk, teaspoon soda, tablespoon cloves, tablespoon nutmeg, tablespoon cinnamon.

CYMBALS.—Half a pound of sugar, a quarter of a pound of butter, a couple of eggs, half a nutmeg, a teaspoonful of saleratus, half a teacup of milk. Stir the butter and sugar together, then add the eggs and a little flour, stir in the milk and saleratus, which should be previously strained, then add enough flour to make it stiff enough to roll out—roll it out half an inch thick in pounded white sugar, cut it with a tumbler into cakes, and bake them on flat buttered tins.

MRS. BROWN'S CAKE.—One and a half cup butter, two and a half cups molasses, five cups flour, teaspoon saleratus. Citron, currants, raisins, cloves, allspice, and nutmeg to taste.

MOCK LADY CAKE.—Three cups flour, two cups sugar, one-half cup butter, one cup sweet milk, whites of four eggs, one teaspoon cream tartar, one-half teaspoon soda. Flavor with peach, rose, or vanilla.

WHITE CITRON CAKE.—Beat one pound butter to a cream; one pound flour, one pound sifted loaf sugar, eight well-beaten eggs, one-half pound almonds, blanched and cut in small pieces; one-quarter pound citron; beat well, and bake in greased tins, lined with paper.

WASHINGTON CAKE.—Stir together, till quite white, a pound of sugar, three-quarters of a pound of butter, then add four beaten eggs. Stir in gradually a pound and a half of flour. Dissolve a teaspoonful of saleratus in a teacup of milk, strain and mix it with a glass of wine, then stir it into the cake, together with a teaspoonful of rosewater, and half a nutmeg. Just before it is baked, add a pound of seeded raisins.

WHIGS.—A kind of cake made in the following manner: Rub a quarter of a pound of butter into two pounds of flour; with half a pint of warm

cream and a gill of ale yeast, make it up into a light paste, and set it before the fire to rise. Grate a nutmeg with some beaten mace and cloves, a quarter of an ounce of caraway seeds, and a quarter of a pound of sugar; work all thoroughly together; roll the dough out tolerably thin, and make the cakes up into any size and form desired. The usual way is to make a large round cake, and to cross it so that it may be easily divided into quarters when made up; put them on tin plates; set them before the fire, or in front of the oven, till they rise again, then bake them in a quick oven.

Doughnuts and Crullers.—One and a half teacups sugar sifted, one-half teacup butter, one-half teacup milk, three eggs, one nutmeg, teaspoonful saleratus. Flour stiff enough to roll. Boil in lard until well browned.

Austin Cake.—Three cups sugar, one cup butter, five cups flour, one and a half cups milk or water, one and a half cup chopped raisins, two eggs, two tablespoonfuls molasses, one teaspoon soda dissolved in water. Salt and spice.

Sugar Snaps.—One cup butter, two cups sugar, three eggs, one teaspoon soda, one tablespoon ginger. Flour to roll.

California Cake.—Two cups sugar, one cup water, one cup butter, three cups flour, two eggs, one teaspoon cream tartar, one-half teaspoon soda. Spice to taste.

Railroad Cake.—One cup sugar, one cup flour, three eggs,—beat the whites separately,—two tablespoonfuls melted butter. Bake in one loaf.

Light Tea Cake.—One cup sugar, two eggs, half cup melted butter, one and one-fourth cups milk, flour to make a stiff batter, two teaspoons cream-tartar, one teaspoon soda. Bake twenty minutes in a hot oven.

Cocoanut Cakes.—Take equal weights of grated cocoanut and powdered white sugar, (the brown part of the cocoanut should be cut off before grating it)—add the whites of eggs beaten to a stiff froth in the proportion of half a dozen to a pound each of cocoanut and sugar. There should be just eggs enough to wet up the whole stiff. Drop the mixture on to buttered plates, in parcels of the size of a cent, several inches apart. Bake them immediately in a moderately warm oven.

Cocoanut Cake.—Two pounds sugar, one pound butter, one and three-quarter pounds flour, ten eggs, two grated cocoanuts, one cup milk, and the milk of the cocoanuts; add one-half teaspoon soda last thing. This makes two loaves.

Cocoanut Drops.—Half pound grated cocoanut, half pound white sugar, whites of three eggs. Mix and drop on greased and papered tins, and bake in a slow oven.

Tea Cakes.—Rub fine four ounces of butter into eight ounces of flour; mix eight ounces of currants and six of fine sugar, two yolks and one white of eggs. Roll the paste the thickness of a cracker, and cut with a wine glass. You may beat the other whites, and wash over them; and either dust sugar or not, as you like.

Common Cake.—Rub eight ounces of butter into two pounds of flour, mix it with three spoonfuls of yeast. Let it rise an hour and a half; then mix in the yolks and whites of four eggs, beaten apart, one pound of sugar, some milk, to make it a proper thickness (about a pint will be sufficient), the rind of a lemon, and a teaspoonful of ginger. Add either a pound of currants, or some caraways, and beat well.

Lemon Cake.—Stir together till very white, a pound of sugar, half a pound of butter—then add eight eggs, beaten to a froth (the whites and yolks should be beaten separately), the grated rind of two lemons, and the juice of half a lemon. Stir in gradually a pound of sifted flour. Line a couple of cake pans with white buttered paper, turn the cake into them, and bake it in a quick oven.

Lemon Cake.—One-half cup butter, two cups sugar, two eggs, one cup milk, three cups flour, one teaspoon soda, two teaspoons cream tartar, the grated rind of one lemon.

Victoria Cakes.—Mix well a quarter of an ounce of baking-powder

with half a pound of flour; beat a quarter of a pound of butter to a cream; add to it two eggs, well beaten, and a quarter of a pound of pounded loaf sugar. Then gradually blend this mixture with the flour, and make it into a paste. Dredge a *little* flour on the board, and lay on it a piece of paste about the size of an egg; roll it round very lightly, and make it shapely with the hand; lay it on an iron baking-plate, and press it gently till it assumes the shape of a bun, about four inches in diameter. Leave a good space between each cake, as they spread in the baking. Let the oven be moderately hot; they will take about ten or twelve minutes.

Macaroons.—Soak half a pound of sweet almonds in boiling-hot water, till the skin will rub off easily; wipe them dry. When you have rubbed off the skins pound them fine with rose-water. Beat the whites of three eggs to a stiff froth; then stir in gradually half a pound of powdered white sugar; then add the almonds. When the almonds are well mixed in, drop the mixture in small parcels on buttered baking-plates, several inches apart; sift sugar over them, and bake them in a slow oven.

New Year's Cookies.—Weigh out a pound of sugar, three-quarters of a pound of butter—stir them to a cream; then add three beaten eggs, a grated nutmeg, two table-spoonsful of caraway seed, and a pint of flour. Dissolve a teaspoonful of saleratus in a tea-cup of milk, strain and mix it with half a tea-cup of cider, and stir it into the cookies—then add flour to make them sufficiently stiff to roll out. Bake them as soon as cut into cakes, in a quick oven, till a light brown.

Jumbles.—Stir together till of a light color, a pound of sugar and half the weight of butter—then add eight eggs beaten to a froth, essence of lemon, or rosewater, to the taste, and flour to make them sufficiently stiff to roll out. Roll them out in powdered sugar, about half an inch thick; cut it into strips about half an inch wide, and four inches long; join the ends together, so as to form rings—lay them on flat tins that have been buttered. Bake them in a quick oven.

Plain Cake.—Mix two pounds of dry flour with four ounces of clean dripping, melted in a pint of milk, three table-spoonsful of yeast, and two well beaten eggs; mix well together, and set aside in a warm place to rise; then knead well and make into cakes; flour a tin, and place it in the oven in a tin; caraway seeds or currants may be added.

Sponge Cake.—Take six eggs, two teacupfuls of sugar, one and a half of flour, one teaspoonful of cream of tartar, one-half teaspoonful of soda, and one teaspoonful essence of lemon; beat the whites of the eggs till very light; mix the yolks with the sugar; beat till very smooth; mix the soda and cream of tartar with the flour; then add to the former mixture; then add the lemon. The whole should be stirred slowly till the top is covered with bubbles. Bake in a quick oven.

Sponge Cake.—Sift one pound of flour and one pound of loaf sugar; take the juice of one lemon, beat ten eggs very light; mix them well with the sugar; then add the lemon and flour; if baked in a pan, two hours is necessary.

Almond Sponge Cake.—Eight ounces almonds blanched and pounded, two ounces flour, one-half pound of sugar, yolks of seven eggs, whites of five eggs.

Queen Cakes.—Mix a pound of dried flour, the same of sifted sugar, and of washed clean currants. Wash a pound of butter in rose-water, beat it well, then mix it with eight eggs, yolks and whites beaten separately, and put in the dry ingredients by degrees; beat the whole an hour; butter little tins, teacups, or saucers, and bake the batter in; filling only half. Sift a little fine sugar over just as you put into the oven.

Frosting for Cake.—Ten teaspoonfuls powdered sugar to the white of an egg. Beat five minutes for each spoonful of sugar.

Cream Cake.—One cup sour cream, one cup sugar, two and a half cups flour, two eggs, one teaspoon soda.

Cream Cake Without Eggs.—Four cups flour, three cups sugar, one

cup butter, two cups sour cream, three teaspoons saleratus dissolved in a little cold water, one-half a grated nutmeg, and a teaspoon essence of lemon.

Boston Cream Cakes—For the Outside.—One pint water, one-half pound butter, three-quarters pound flour, ten eggs; boil the water and butter together; stir in the flour while boiling; take it from the fire to cool; when cold, add the eggs by breaking them into the mixture one at a time; stir them in very thoroughly, but be sure not to beat them; add a teaspoonful of cold water; drop them into your pan; form them with a spoon, as they do not rise much. Bake fifteen or twenty minutes in a hot oven, and do not open the door till they are done.

Mixture for Inside.—Two cups sugar, one cup flour, one pint milk, four eggs; boil the milk; beat the eggs, sugar and flour together; stir them into the milk, while boiling, until thickened; next add essence of lemon, to flavor; when the mixture is cool fill your cakes.

Jelly Cake.—One heaping cup butter, two and a half cups sugar, five cups flour, one cup milk, teaspoon soda, four eggs, a little nutmeg. Bake on plates. For four cakes.

Orange Jelly Cake.—Juice and rind of two oranges, thickened with powdered sugar, stir in one package of desiccated cocoanut, leaving enough to sprinkle on top layer; four eggs, half a cup of butter, two cups sugar, one cup of water and flour, enough to make the butter bake as for jelly cake, spreading the dry cocoanut on top layer.

Fruit Cake.—One pound of flour, one of sugar, three-quarters of a pound of butter, two pounds of seeded raisins, two of currants, one of citron, a quarter of a pound of almonds, half an ounce of mace, a teaspoonful of rose-water, a wine-glass full of brandy, one of wine, and ten eggs; stir the sugar and butter to a cream; then add the whites and yolks of the eggs, beaten separately to a froth—stir in the flour gradually; then the wine, brandy and spice; add the fruit just before it is put into the pans. It takes over two hours to bake it if the loaves are thick—if the loaves are thin, it will bake in less time. This kind of cake is the best after it has been made three or four weeks, and it will keep good five or six months.

Fruit Cake.—One pound sugar, one pound flour, one pound butter, ten eggs, one cup molasses, saleratus to make it foam; five pounds fruit, one pound citron, one glass brandy, two glasses wine; cloves, cinnamon, and mace. Bake six hours in a slow oven. This is excellent.

Cheap Fruit Cake.—To one quart of sifted flour add a teacup of sugar, a half a cup of butter, two teaspoonfuls of cream-tartar, one of soda; rub them all thoroughly together into the flour; stir in cold water sufficient to make a stiff batter; pour it into a small tin pan; bake one hour—in a quick oven the first half hour, then quite slow; spice with any kind to suit the taste, and add a teacup of raisins.

Fruit Cake Without Eggs.—Two pounds of flour, one and three-quarter pounds of sugar, one-half pound of butter, one pint of milk, one-half teaspoon salt, one and a half teaspoon soda dissolved in a little water, one nutmeg, one pound of raisins. This makes three loaves. Warm the milk, and add the butter and sugar beaten to a cream; then add the other ingredients.

Every-day Fruit Cake.—One cup butter, four eggs, two cups sugar, one grated nutmeg, one pint flour, one pound raisins, one cup boiled cider, or sour milk, one cup molasses, one-half teaspoon soda; cloves, cinnamon, and mace to taste.

Currant Cake.—One-half cup butter, two cups sugar, one cup milk, one egg, one teaspoon soda, two teaspoons cream-tartar, flour for a good batter, large handful of currants.

Raisin Cake.—One cup butter, one cup sour milk, one cup molasses, two cups sugar, three eggs, six cups flour, one teaspoon soda, one cup raisins. Spice to taste.

Plum Cake.—Flour one pound, butter one-quarter pound, sugar one-

quarter pound, currants one-quarter pound, three eggs, one-half pint of milk, carbonate of soda, a small teaspoonful.

Ginger Biscuits.—Take three ounces of fresh butter, two pounds of flour, three ounces of pounded sugar, and two of ginger finely powdered; knead these ingredients into a stiff paste, with new milk; roll it thin; stamp out the biscuits with a cutter, and bake them in a slow oven until they are crisp right through, but keep them of a pale color.

Sponge Gingerbread.—Two tablespoons of butter, two cups of molasses, one cup of milk, teaspoon of soda, flour to make a pretty stiff batter; ginger to suit.

Ginger Cookies.—One cup of sugar, one of butter, one of molasses, one tablespoonful of ginger, one of cinnamon, and two teaspoonfuls of saleratus dissolved in three tablespoonfuls of hot water. Bake quickly.

Ginger Nuts.—1. Flour dried and sifted, one pound; treacle, one pound; good moist sugar, three ounces; fresh butter, one-quarter pound; ground ginger, one and one-half ounces; citron and candied orange peel, cut small, three-quarters of an ounce each; melt the butter with the treacle, and when it is about milk-warm, add it to the flour and other ingredients, and then mix all well together; with a spoon drop the nuts upon buttered tins, and bake them. 2. Dissolve one-quarter pound of butter in three-quarters of a pound of treacle, put it into a pan large enough to contain the rest of the ingredients, and when almost cold stir one pound of dried and sifted flour, one-half pound of coarse, brown sugar, one-half ounce of caraway seeds, three-quarters of an ounce of ground ginger, and the peel of a lemon grated; mix all of these well together, and let it remain till the following day; then make it into nuts by pinching it into pieces with the finger and thumb. Bake them upon buttered tins in a quick oven. 3. Flour, three pounds; sugar, one pound; butter, one and one-half pounds; treacle, three and one-half pounds; ginger, two ounces; allspice, one ounce; candied orange and lemon peel, two ounces each, chopped fine; one lemon peel grated; and one nutmeg ground, and a wine-glass full of brandy; rub the flour and butter together, add the other ingredients, and mix the whole into a paste; divide it into pieces the size of a nut and bake them on tins.

Ginger Cakes.—Take three quarters of an ounce of powdered ginger, one pound of fine flour well-dried, three-quarters of a pound of the best Lisbon sugar, and half a pound of butter; mix these ingredients with water to a stiff paste, roll it out, cut out the cakes, and bake them on a tin in a slow oven.

Lapland Cakes.—These are the most delicate of all tea-cakes, and delightful if made by a scrupulously careful cook. Take five eggs, beat the whites and yolks separately till both are as light as may be; then mix them together and add one pint of rich cream, with as much flour as will make it the consistency of pound-cake batter. This quantity we have ascertained by experiment to be about one pint of sifted flour; half fill small tin shapes with the batter, and set it to bake in a well-heated oven. Ten minutes should suffice for the baking, and the cakes should be sent to table while piping hot.

Plainer Lapland Cakes.—Beat two eggs very light; add one quart of sweet milk, and stir it in sifted flour and a little salt until it is of the consistency of waffle batter; bake them quickly in tin puff pans. Cakes made by this recipe are nice, but not equal, of course, to those made by the former directions.

Shrewsbury Cake.—Stir together three-quarters of a pound of sugar, half a pound of butter. When white, add five beaten eggs, a teaspoonful of rose-water, or a nutmeg, and a pound of flour; drop it with a large spoon on to flat tins that have been buttered—sift sugar over them.

Bath Cakes.—Mix well together one pound flour, one-half pound butter, five eggs and a cup full of yeast; set the whole before the fire to rise; after it rises add one-quarter of a pound of white sugar, and one ounce caraway seeds well mixed in, and roll the paste into little cakes. Bake them on tins.

Plain Cream Cake.—Dissolve a teaspoonful of saleratus in a wine glass of milk; strain it on to a little sifted flour; beat three eggs with a tea-cup of rolled sugar; mix them with the above ingredients, together with half a grated nutmeg; add a tea-cup of thick cream and sifted flour, to render it of the consistency of unbaked pound cake. Bake it as soon as the cream and flour are well mixed in, as stirring the cream much decomposes it.

Rich Cream Cake.—Stir together till very white, half a pound of butter, three-quarters of a pound of sugar; beat the whites and yolks of seven eggs separately to a froth; stir them into the cake—put in a wine-glass of brandy, a grated nutmeg, and a pound and a half of sifted flour. Just before it is baked, add half a pint of thick cream, and a pound of seeded raisins.

White Cake.—Two cupfuls of sugar and half a cupful of butter; three-fourths of a cupful of milk; the whites of six eggs; three cupfuls of sifted flour, with a teaspoonful of cream-tartar mixed through it; half a teaspoonful of soda, thoroughly dissolved in a little milk, vanilla or almond extract.

Strawberry Short-Cake.—One teacupful of sour milk (not buttermilk), a piece of butter the size of a walnut, one-third of a teaspoonful of soda, one-quarter teaspoonful of salt; mix very lightly and bake in a quick oven. While baking take one and one-half pints of strawberries, mashed fine in the hand; when the cake is cooked enough cut in two, taking off about one-third, leaving two-thirds at the bottom; spread each part thickly with batter; then put on the large portion a layer of sugar; then the berries, then sugar, and lastly, turn the other part over. Serve immediately.

Tunbridge Cake.—Six ounces of butter, the same quantity of sugar, three-quarters of a pound of flour, a couple of eggs, and a teaspoonful of rose-water; stir to a cream the butter and sugar, then add the eggs, flour, and spice. Roll it out thin, and cut in into small cakes.

Delicate Tea Cake.—The whites of three eggs beaten to a froth, one cup of pulverized white sugar, one-half cup sweet milk, one teaspoonful of cream of tartar, one-half teaspoonful of soda, two and one-half cups of flour, a teaspoonful of almonds, one-half cup of melted butter.

Chocolate Cake.—One cupful of butter, two cupfuls of sugar, the yolks of five eggs and whites of two, one cupful of milk, three and one-half cups of flour, one half a teaspoonful of soda, one teaspoonful of cream of tartar, sifted in the flour. Bake in jelly cake tins.

Mixture for Filling.—Whites of three eggs, one and one-half cupfuls of sugar, three tablespoonfuls of grated chocolate, one teaspoonful of vanilla; beat well together and spread between the layers and on top of the cake.

Rich Soda Cake.—One pound of pulverized loaf-sugar mixed with three-quarters of a pound of sweet butter, the beaten whites of fourteen eggs, and two teaspoonfuls of cream of tartar, sifted with a pound of flour, and lastly, a teaspoonful of soda dissolved in half a teacupful of sweet milk, and strained. Bake immediately.

Soft Molasses Gingerbread.—Melt a teacup of butter—mix it with a pint of molasses, a tablespoonful of ginger, a pint of flour, and a couple of beaten eggs. Fresh lemon peel cut into small strips improves it; dissolve a couple of teapoonsfuls of saleratus in half a pint of milk, and stir it into the cake; add flour to render it the consistency of unbaked pound cake. Bake it in deep pans about half an hour.

Ginger Snaps.—Take seven pounds of flour, one quart of molasses, one pound of brown sugar, one pound of butter, two ounces ground ginger, and then take one gill of water, three-quarters of an ounce of saleratus; mix them all into dough, and cut them out something larger than marbles, and bake them in a moderate oven.

Light Gingerbread (home recipe).—To three quarts of flour put one pound of butter and three eggs, three pints of molasses and three teaspoonfuls of pearl ash, dissolved in half a teacupful of sour cream or buttermilk.

Unlike biscuit, gingerbread requires a good deal of soda to make it rise, and therefore pearl-ash is used, as being stronger. If soda is preferred, one dessert-spoonful will not be found too much to allow to a quart of flour. This cake is better when the batter is poured in shallow pans than when made into dough, rolled out, and cut in shapes. Your success must, after all, depend very much upon the kind of molasses used, for the commoner sorts will not make cake any more than will syrup. Flavor with ginger, and add other spices to your taste.

GINGERBREAD.—Mix together three and one-half pounds of flour, three-quarters of a pound of butter, one pound sugar, one pint molasses, quarter pound ginger, and some ground orange-peel.

APPLE PIE.—Make a good puff paste and lay it round the inside of the dish you intend using; peel, core, and slice a sufficient number of apples according to the size of the dish, and lay half of them in, cover these with sugar, and add half a lemon peel grated, with a few drops of the juice, a sprinkling of cloves, and half a stick of bruised cinnamon; then put in the rest of the apples and sprinkle again with sugar; add the upper crust and bake.

CREAM PIE.—One tablespoonful of white sugar, one egg, one tablespoonful of flour, one tablespoonful melted butter; add sweet milk enough to fill your pie plate, and lemon if preferred. This should be baked with but one crust.

MINCE PIE.—The best kind of meat for mince pies is neat's tongue and and feet. The shank of beef makes very good pies. Boil the meat till perfectly tender—then take it up, clear it from the bones and gristle; chop it fine enough to strain through a sieve; mix it with an equal weight of tart apples, chopped very fine; moisten the whole with cider—sweeten it to the taste with sugar, and very little molasses—add mace, cinnamon, cloves and salt to the taste. If you wish to make your pies rich, put in wine or brandy to the taste, and raisins, citron, and Zante currants. The grated rind and juice of lemons improve the pie. Make the pies on shallow plates, with apertures in the upper crust, and bake them from half to three-quarters of an hour, according to the heat of the oven. Meat prepared for pies in the following manner will keep good for several months, if kept in a cool, dry place: To a pound of finely chopped meat, a quarter of a pound of suet, put half an ounce of mace, one ounce of cinnamon, a quarter of an ounce of cloves, two teaspoonfuls of salt. Add if you like the following fruits: half a pound of seeded raisins, half a pound of Zante currants, a quarter of a pound of citron.

CURRANT AND GOOSEBERRY PIE.—Currants and gooseberries are the best for pies when of a full growth, just before they begin to turn red; they are tolerably good when ripe. Currants mixed with ripe raspberries or mulberries, make very nice pies. Green currants and gooseberries for pies are not apt to be sweet enough unless the sugar is scalded in before they are baked, as the juice of the currants is apt to run out while they are baking, and leave the fruit dry. Stew them on a moderate fire, with a teacup of water to a couple of quarts of currants; as soon as they begin to break, add the sugar, and let it scald for a few minutes. When baked without stewing, put to each layer of fruit a thick layer of sugar. There should be as much as a quarter of a pound of sugar to a pint of currants, to make them sufficiently sweet. Green currant pies are good sweetened with molasses and sugar mixed.

SWEET MARLBOROUGH PIE.—Procure sweet, mellow apples, pare and grate them, to a pint of the grated pulp put a pint of milk, a couple of eggs, two tablespoonfuls of melted butter, the grated peel of a lemon, and half a wine-glass of brandy; sweeten it to the taste with nice brown sugar. The eggs should be beaten to a froth; then the sugar stirred into them and mixed with the rest of the ingredients. A little stewed pumpkin, mixed with the apples, improves the pie. Bake the pie in deep plates, without an upper crust.

Pumpkin Pie.—Halve the pumpkin; take out the seeds—rinse the pumpkin, and cut it into small strips; stew them, over a moderate fire, in just sufficient water to prevent their burning to the bottom.

Cocoanut Pie.—Cut off the brown part of the cocoanut; grate the white part, and mix it with milk, and set it on the fire, and let it boil slowly eight or ten minutes. To a pound of the grated cocoanut allow a quart of milk, eight eggs, four tablespoonfuls of sifted white sugar, a glass of wine, a small cracker, pounded fine, two tablespoonfuls of melted butter, and half a nutmeg. The eggs and sugar should be beaten together to a froth, then the wine stirred in. Put them into the milk and cocoanut, which should be first allowed to get quite cool; add the cracker and nutmeg; turn the whole into deep pie plates, with a lining and rim of puff paste. Bake them as soon as turned into the plates.

Tart Pie.—Sour apples, cranberries, and peaches, and all nice tarts. Stew, and strain them when soft. Peach tarts require a little lemon-juice, without they are sour; grate in lemon peel, add brown sugar to the taste. Put in each pie one beaten egg to make it cut smooth. Bake the pies on shallow plates, with an under crust and rim of pastry; ornament the pie with very small strips of pastry. When the crust is done, remove the pies from the oven.

Prune Pie.—Prunes that are too dry to eat without stewing, can be made into good pies. Turn enough boiling water on the prunes to cover them; set them on a few coals, and let them remain till swelled out plump. If there is not water sufficient to make a nice syrup for the pies, add more, and season them with cinnamon or cloves. The juice and grated peel of a lemon gives them a fine flavor. Add sugar to the taste, and bake them in deep pie plates.

Grape Pie.—Grapes make the best pies when very tender and green. If not very small, they should be stewed and strained, to get out the seeds, before they are made into pies. Sweeten them to the taste when stewed: they do not require any spice. If made into a pie without stewing, put to each layer of grapes a thick layer of sugar, and a tablespoonful of water.

Rice Pie.—To a quart of boiling water, put a small teacup of rice; boil it till very soft, then take it from the fire, and add a quart of cold milk; put in a teaspoonful of salt, a grated nutmeg, five eggs beaten to a froth; add sugar to the taste, and strain it through a sieve. Bake it in deep pie plates, with an under crust and rim of pastry; add if you like a few raisins.

Peach Pie.—Take mellow, juicy peaches—wash and put them in a deep pie plate, lined with pie crust. Sprinkle a thick layer of sugar on each layer of peaches, put in about a tablespoonful of water, and sprinkle a little flour over the top; cover it with a thick crust, and bake the pie from fifty to sixty minutes. Pies made in this manner are much better than with the stones taken out, as the prussic acid of the stone gives the pie a fine flavor. If the peaches are not mellow, they will require stewing before being made into a pie. Dried peaches should be stewed soft, and sweetened, before they are made into a pie; they do not require any spice.

Mince Pies without Meat.—Take of currants, apples chopped fine, moist sugar, and suet well chopped, a pound of each; a quarter of a pound of raisins stoned and chopped small, the juice of four Seville oranges, the juice of two lemons, the rind of one shred fine, nutmeg and mace to suit the palate, and a glass of brandy. Mix all together, put it in a pan, and keep it closely tied up.

Apple Tart, *with Quince.*—Prepare the apples as for apple pie, and lay them in a dish; then stew two quinces with a little water, sugar, and butter, and pour them on the apples; then add a layer of pounded sugar, and the rind of a lemon grated; cover with puff-paste, and bake to a light brown.

Marlborough Tarts.—Take tart, juicy apples—quarter them, and stew them till soft enough to rub through a sieve. To twelve tablespoonfuls of the strained apple, put twelve of sugar, the same quantity of wine, six tablespoonfuls of melted butter, four beaten eggs, the juice and grated rind of a

lemon, half a nutmeg, and half a pint of milk. Turn this, when the ingredients are well mixed together, into deep pie plates that are lined with pastry, and a rim of puff paste round the edge. Bake the tarts about half an hour.

Oxford Dumplings.—Take eight ounces of biscuit that is pounded fine, and soak it in just sufficient milk to cover it. When soft, stir in three beaten eggs, a tablespoonful of flour, and a quarter of a pound of Zante currants. Grate in half a nutmeg, and do up the mixture into balls of the size of an egg; fry them till a light brown.

Apple Dumplings.—Pare tart, mellow apples—take out the cores with a small knife, and fill the holes with sugar. Make good pie crust; roll it out about two-thirds of an inch thick; cut it into pieces just large enough to enclose one apple. Lay the apples on them, and close the crust tight over them; tie them up in small pieces of thick cloth, that has been well floured; put the dumplings in a pot of boiling water, and boil them an hour without any intermission; if allowed to stop boiling, they will be heavy. Serve them up with pudding sauce, or butter and sugar.

Lemon Mince Pies.—Take a large lemon, squeeze the juice from it, and boil the outside till it becomes soft enough to beat to a smash; put to it three large apples, four ounces of suet, the same of sugar, and half a pound of currants; add the juice of the lemon, and some candied fruit, the same as for other pies. Make a short crust, and fill the patty-pans in the usual way.

Cherry Tart.—Line the sides of a dish with good crust, strew in sugar, fill it with picked cherries, and put sugar at the top; red currants may be added if liked; cover with crust, and bake.

Currant Tart.—Line a dish with puff paste, strew powdered sugar over the bottom of it; then put in alternate layers of currants carefully picked, and sugar, till the dish is full; then cover and bake it. The addition of rasberries or mulberries to currant tart is a great improvement.

Quince Tart.—Take a few preserved quinces, put an equal weight of syrup, made with sugar and water and preserve, into a preserving pan; boil, skim and put in the fruit; when somewhat clear, place the quinces in a tart-dish with puff paste as usual. Cover, bake it, and when done lift the top gently, put in the syrup, ice it, and serve.

Summer Mince Pies.—Four crackers, one cup and a half sugar, one cup molasses, one cup cider, one cup water, two-thirds cup butter, one cup chopped raisins, two eggs beaten and stirred in last thing. Brandy and spice to taste.

Lemon Cream Pie.—One cup sugar, one cup water, one raw potato grated, juice and grated rind of one lemon. Bake in pastry top and bottom. This makes one pie.

Ground Rice Pudding.—Mix a pint and a half of ground rice, smooth, with a quart of milk; stir in a glass of wine, a quarter of a pound of melted butter, a teaspoonful of salt, and spice to the taste. Beat eight eggs, and stir them in; turn the whole into a buttered pudding dish, and when it has baked a few minutes, add half a pound of raisins, or Zante currants.

A Baked Rice Pudding, without Eggs.—Pick over and wash two small teacups of rice, and put it into two quarts of milk. Melt a small teacup of butter, and put in, together with two of sugar, a grated nutmeg, and a couple of teaspoonfuls of salt, and bake the pudding about two hours. This pudding does not need any sauce, and is good either hot or cold. If you wish to have the pudding very rich, add, when it has been baking five or six minutes, half a pound of raisins.

Sago Pudding.—Rinse half a pound of sago in hot water, till it is thoroughly cleansed; then drain off the water, and boil the sago in a quart of milk, with a stick of cinnamon or mace. Stir it constantly, or it will burn. When soft, take it from the fire; take out the stick of cinnamon, and put in a quarter of a pound of butter. Mix a wine glass of wine with four large spoonfuls of fine sugar, and stir it into the sago; add, when cold, five beaten eggs, and bake the pudding in a deep dish, with a lining and rim of pastry. Strew over the pudding a quarter of a pound of Zante

currants, and bake it directly, in a quick oven. It is the best when cold.

Tapioca Pudding.—To a quart of warm milk put eight tablespoonfuls of tapioca. Let it soak till it softens; then stir it up, and put to it a couple of tablespoonfuls of melted butter; four beaten eggs, and cinnamon or mace to the taste. Mix four tablepoonfuls of white powdered sugar with a wine glass of wine, and stir it into the rest of the ingredients. Turn the whole into a pudding dish that has a lining of pastry, and bake it immediately.

Almond Pudding.—Turn boiling water on three-quarters of a pound of sweet almonds. Let them remain in it till the skins will slip off easily—rub the skins off with a dry cloth. When they are perfectly dry, pound them fine, with a tablespoonful of rose-water. Beat six eggs to a froth, then mix them with four.

Lemon Pudding.—Grate the rind of two fresh lemons, being careful not to grate any off the white part. Squeeze the juice out of the lemons, and strain it, to separate it from the seeds. Mix it with six large spoonsfuls of fine white sugar. Take a quart of milk, and mix it with the rind of the lemons, a couple of tablespoonfuls of pounded crackers, and a tablespoonful of melted butter. Beat six eggs to a froth, and stir them into the milk. Stir in the lemon-juice and sugar last, add then turn the whole into a pudding dish that has a lining and rim of puff paste. Bake it from twenty-five to thirty minutes. It should not be eaten till it is cold.

English Plum Pudding.—This dish is prepared in a variety of ways, the following being the best receipts: 1. Take a pound of fresh beef-suet, very finely minced, a pound of raisins stoned and chopped, a pound of currants cleaned and dried, a pound of flour, the grated peel of a lemon, half of a nutmeg, six well-beaten eggs, an ounce of candied orange-peel and half an ounce of candied lemon peel minced, half a pound of brown sugar, a wineglassful of brandy and a teacupful of cream. Mix all the ingredients well with the flour. Boil the pudding in a cloth, put it into a copper of boiling water, and keep it boiling for seven hours. Before serving, strew grated loaf sugar over it. 2. A pound of raisins stoned, half a pound of currants well cleaned, a pound of fresh beef suet finely minced, five tablespoonfuls of grated bread, three tablespoonfuls of flour, two of brown sugar, one teaspoonful of pounded ginger, one of cinnamon and one of salt; six eggs well beaten, and a gill of rum: mix these thoroughly together the day before it is to be boiled; boil it in a cloth or mould for four or five hours. 3. Take a pound of the best raisins stoned, and a pound of currants; chop very small a pound of fresh beef-suet, blanch and pound two ounces of sweet almonds and half an ounce of bitter ones; mix the whole well together with a pound of sifted flour, and the same weight of crumb of bread soaked in milk, squeeze it dry and stir with a spoon until reduced to a mash, before it is mixed with the flour. Cut into small pieces two ounces each of preserved citron, orange, and lemon-peel, and add a quarter of an ounce of mixed spice; put a quarter of a pound of moist sugar into a basin with eight eggs, well beaten; stir this with the pudding, and make it of a proper consistence with milk. Pour a gill of brandy over the fruit and spice mixed together in a basin, and allow it to stand three or four hours before the pudding is made, stirring occasionally. Tie it in a cloth, and boil it for five hours. 4. Take half a pound of grated bread, a quarter of a pound of finely-minced suet, a tablespoonful of flour, half a pound of currants, two ounces of brown sugar, and a wineglassful of brandy: mix all altogether with a sufficient quantity of milk to make it into a stiff batter; boil it in a cloth for four hours.

Rice Snow Balls.—Pare small, tart apples, and take out the cores with a small knife—fill the cavity with a stick of cinnamon or mace. Put each one in a small floured bag, and fill the bags about half full of unground rice. Tie up the bags so as to leave a great deal of room for the rice to swell; put them in a pot of water, with a tablespoonful of salt to a couple of quarts of water.

A Quaker Pudding.—Slice up three-quarters of a pound of bakers' bread; beat eight eggs to a froth, stir in several large spoonfuls of sugar, and mix it with a quart of milk, and a grated nutmeg. Turn it on to the sliced bread—let the whole remain till the bread has soaked up most of the milk, then stir in a couple of tablespoonfuls of flour, a teaspoonful of salt, and turn it into a pudding bag, and boil it an hour. Serve it up with rich sauce.

Rice Pudding, with Eggs.—Boil a quarter of a pound of unground rice in a quart of milk till soft, then stir in a quarter of a pound of butter. Take it from the fire, put in a pint of cold milk, a couple of teaspoonfuls of salt, and a grated nutmeg. When it is lukewarm, beat four eggs with a quarter of a pound of sugar, and stir it into the pudding—add half a pound of raisins, and turn the whole into a buttered pudding dish, and bake it three quarters of an hour.

Baked Indian Pudding.—Boil a quart of milk, and turn it on to a pint of sifted Indian meal. Stir it well, so as to scald the meal—then mix three table spoonfuls of wheat flour with a pint of milk.

Boiled Indian Pudding.—Stir enough sifted Indian meal into a quart of boiling milk or water, to make a very stiff batter; then stir in a couple of tablespoonfuls of flour, three of sugar or molasses, half a spoonful of ginger, or a couple of teaspoonfuls of cinnamon, and a couple of teaspoonfuls of salt. Two or three eggs improve the pudding, but are not essential: some people like a little chopped suet in them. The pudding will boil, so as to be very good, in the course of three hours, but it is better for being boiled five or six hours. Some cooks boil them eight or nine hours: when boiled so long, it is necessary to boil them several hours the day before they are to be eaten.

Cracker Pudding.—Mix ten ounces of finely pounded crackers with a wineglass of wine, a little salt, and half a nutmeg, three or four tablespoonfuls of sugar, two of melted butter. Beat eight eggs to a froth—mix them with three pints of milk, and turn them on to the rest of the ingredients. Let it remain till the crackers begin to soften, then bake it.

Corn Puddings.—Grate sweet green corn—to three teacups of it when grated put two quarts of milk, eight eggs, a couple of teaspoonfuls of salt, half a teacup of melted butter, and a grated nutmeg. Bake the pudding an hour; serve it up with sauce.

Cottage Pudding.—One teacupful of sugar and half a cupful of butter, creamed together; yolks of three eggs, and white of one; after they have been beaten, a cupful of milk (reserving out enough to dissolve half a teaspoonful of soda); one pint of sifted flour, with a teaspoonful of cream-tartar mixed through it. At the last moment add the soda, thoroughly dissolved. bake in a buttered cake-pan. Make a frosting with the whites of two eggs beaten to a stiff froth, with half a large cupful of sugar stirred in. As soon as it is baked, spread the frosting on. Set it on the ice; then serve with wine sauce, made with two cupfuls of brown sugar, one cupful of butter, two eggs, and one cupful of sherry wine. Beat all together very light before you add the wine. Let it steam, not boil (put it into a tin bucket, and place it in a vessel of boiling water), stirring all the time until it scalds and thickens. Put a teaspoonful of vanilla into the sauce-bowl, and pour the sauce over it.

Plum Pudding.—Pound 6 crackers, and soak them over night in milk enough to cover them, then add 3 pints of milk, 4 or 5 eggs, raisins ½ lb., spice with nutmeg and sweeten with sugar and molasses. Bake about 2 hours.

Hard Times Pudding.—½ pint of molasses or syrup, ½ pint water, 2 teaspoonfuls of soda, 1 teaspoonful of salt, flour enough to make a batter; boil in a bag three hours. Eat it with sauce.

Apple Custard.—Take apples, pared, cored, and slightly stewed, sufficient to cover the dish, 8 eggs, 1 qt. of milk; spice to your taste; bake it ⅓ of an hour.

Apple Pudding, *Baked.*—Peel and core twelve large apples, and put them into a saucepan with a teacupful of water; boil them until very soft, beat them well, and stir in a quarter of a pound of butter, a pound of loaf sugar, the peel of two lemons cut into shreds, the juice of three; the yolks of eight eggs, previously beat up; mix all well together, turn into a dish lined with puff-paste, and bake in a moderate oven.

Apple Pudding, *Boiled.*—Peel, core, and slice apples in sufficient quantity for the size of the pudding intended, make a good puff-paste, roll it out to about half an inch in thickness, place the apples in, and close up the crust, tie it up in a cloth, and set it on the fire; if it is a moderate sized pudding, two hours will be sufficient to boil it; if large, three hours will be required.

Apple Pudding, *Swiss.*—Line a dish with thin paste, put in a layer of sliced apples and sugar, then a thin layer of pounded rusks that have been soaked in milk, then another layer of apples, and another of rusks; add melted butter, and powdered sugar.

Apple Puffs.—Peel and core a sufficient number of apples, and stew them in a stone jar in the oven; then let then cool, and mix the pulp with sugar and lemon peel shred fine. Bake them in thin paste, and in a quick oven.

Apple Snowballs.—Pick and wash well three quarters of a pound of rice, boil it in plenty of water for a quarter of an hour, then drain, and let cool. Pare and core (but without dividing them) half a dozen large apples, enclose them in the rice separately, and boil them for one hour. When eaten, a little butter and sugar, with powdered nutmeg or cinnamon, will improve their flavor.

Cocoanut Pudding.—To a large grated cocoanut add the whites of 6 eggs, ½ lb of sugar, 6 ounces of butter, ½ a wineglassful of rose-water, and bake in or out of paste.

Winter Pudding.—Take the crust of baker's loaf of bread, and fill it with plums, boil it in milk and water.

Rice Pudding.—Take 1 lb. of rice, boiled well with rich milk, stirring well until it is soft, and then add ½ lb. butter, 12 eggs, well beaten, and spice to your taste, and bake it.

Snowdon Pudding.—Prepare one pound of sponge-cake batter in the following manner, to be baked in a thin sheet; To one pound of eggs, weighed in the shell, put one pound of pulverized white sugar, and ten ounces of flour. Flavor with the juice and grated rind of a fine fresh lemon, or, if that is not accessible, a teaspoonful of pure extract of lemon. When baked and while hot, spread over the cake a layer of some nice preserves, strawberry or raspberry jam being especially nice for the purpose. Make it into a roll as neatly as possible, and strew with powdered sugar. Serve with sweet sauce, made in these proportions: Allow one ounce of sugar (brown is best) to each person to be served, half that amount of butter creamed, the yolk of one egg, and a gill of white wine, flavoring highly also with a fresh lemon. Be sure, in preparing this sauce, to let it simmer slowly until just boiling hot, when it will be sufficiently cooked. This pudding makes a suitable dessert throughout the cold season, and is very generally relished.

Baked Potato Pudding.—Baked potatoes skimmed and mashed, 12 oz., suet 1 oz., cheese grated fine, 1 oz., milk 1 gill. Mix the potatoes, suet milk, cheese and all together. If not of a proper consistence, add a little water. Bake in an earthen pot.

Dandy Pudding.—Four eggs broken and beaten separately, five tablespoonfuls of hot sugar, to be added to the whites after they are well beaten so that they will stand alone. Four heaping tablespoonfuls of brown sugar must be beaten into the yolks with two tablespoonfuls of corn starch; one quart of boiling milk; pour over the yolks, stirring until well mixed. Any flavoring may be used that suits one's taste. The whites are to be put on top and nicely browned.

ORANGE PUDDING.—Take 1 lb. of butter, 1 lb. of sugar, 10 eggs, the juice of 2 oranges, boil the peel, then pound it fine and mix it with the juice; add the juice of 1 lemon, a wineglassful of brandy, wine and rose-water. If you do not have the fruit add the extracts.

CUSTARD PUDDING.—Take 1 pint of milk, 4 spoonfuls flour, 6 eggs, spice to your taste and bake.

BAKED PUDDING.—5 tablespoonfuls of corn starch to one quart of milk, dissolve the starch in a part of the milk; heat the remainder of the milk to nearly boiling, having salted it a little; then add the dissolved starch to the milk; boil 3 minutes, stirring it briskly; allow it to cool, and then thoroughly mix with it three eggs, well beaten, with 3 tablespoonfuls of sugar; flavor to taste, and bake it ½ an hour. This pudding ranks second to none.

ALMOND CUSTARDS.—Blanch and pound fine, with a table spoonful of rose-water, four ounces of almonds. Boil them four or five minutes in a quart of milk, with sufficient white sugar to sweeten the milk. Take it from the fire, and when lukewarm, stir in the beaten yolks of eight, and the whites of four eggs. Set the whole on the fire, and stir it constantly until it thickens; then take it up, stir it till partly cooled, and turn it into cups. If you wish to have the custards cool quick, set the cups into a pan of cold water; as fast as it gets warm, change it. Just before the custards are to be eaten, beat the reserved whites of the eggs to a froth, and cover the top of the custards with them.

CREAM CUSTARDS.—Sweeten a pint of cream with powdered white sugar; set it on a few coals: when hot, stir in white wine until it curdles—add rose-water or essence of lemon to the taste, and turn it into cups. Another way of making them, which is very nice, is to mix a pint of cream with one of milk, five beaten eggs, a tablespoonful of flour, and three of sugar. Add nutmeg to the taste, and bake the custards in cups or pie plates in a quick oven.

MOTTLED CUSTARDS.—Stir into a quart of milk, while boiling, the beaten yolks of six eggs. Beat the whites of the eggs with three tablespoonfuls of powdered white sugar, if the custards are liked very sweet—if not, a less quantity will answer. Stir in the whites of the eggs a minute after the yolks have set, so as to be thick. Season the custard with essence of lemon or rosewater—stir it till it becomes thick and lumpy; then turn it into cups.

CUSTARD.—This dish is usually partaken of cold, and is either poured over fruit tarts, confections, &c., or served separately in custards cups. The flavoring may be given according to taste.

CUSTARD, *Baked.*—Mix a quart of new milk with eight eggs well beaten, strain the mixture through a fine sieve, and sweeten it with six ounces of sugar; add a quarter of a saltspoonful of salt, and pour the custard into a deep dish, with or without a lining or rim of paste; grate nutmeg and lemon peel over the top, and bake it in a very slow oven from twenty to thirty minutes, or even longer, should it not be firm in the centre. A custard, if well made and properly baked, will appear quite smooth when cut, and there will be no whey in the dish.

CUSTARD, *Boiled.*—Boil a pint of milk with lemon-peel and cinnamon; mix a pint of cream and the yolks of five eggs, or if cream be not used, more eggs must be added; strain the milk and sweeten it, and pour it on to the cream and eggs, stirring it well with a whisk; then simmer it off till of a proper consistence, *stirring it one way* all the time, to prevent its curdling. When the custard is removed from the fire, keep stirring it till cool; then put into glasses or cups. Rice flour, or arrowroot, rubbed to a smooth paste in a cup of cold milk, may be used for the thickening, if required.

CUSTARD CREAM.—Boil in half a pint of milk, a stick of cinnamon, the rind of a lemon pared thin, and two or three laurel leaves: strain, and add to it three pints of cream; stir into it the well-beaten yolks of eight eggs; sweeten with powdered loaf sugar, put it into a saucepan, and stir it constantly till it thickens; pour it into a deep dish, and stir it now and then till cold. Serve in glasses or cups.

To Preserve Cream for Sea Voyages.—Take rich, fresh cream, and mix it with half of its weight of white powdered sugar. When well mixed in, put it in bottles, and cork them tight; when used for tea or coffee, it will make them sufficiently sweet without any additional sugar.

Substitute for Cream in Coffee.—Beat the white of an egg to a froth; —put to it a small lump of butter, and turn the coffee to it gradually, so that it may not curdle. It is difficult to distinguish the taste from fresh cream.

Custard Powders.—Sago meal and flour, 1 lb. each; color with turmeric to a cream color. Flavor with essence of almonds, 1 dr.; ess. of lemon 2 drs. Use with sweetened milk to form extemporaneous custards.

Pineapple Preserve.—Pare and grate the pineapple; Take an equal quantity of fruit and sugar. Boil slowly one hour.

Preserved Pears.—Take out stems and cores, and pare them. Boil in water till tender; do not break them in taking out. Make a syrup of a pound of sugar to a pound of fruit, and boil the fruit in the syrup till clear.

Perserved Oranges.—Boil the oranges in water till you can run a straw through the skin. Clarify three-quarters of a pound of sugar for each pound of fruit. Take the oranges from the water and pour the hot syrup on them. Let them stand one night. Next day boil them in the syrup till it is thick and clear.

Purple Plum Preserved.—Take an equal weight of fruit and nice sugar; take a clean stone jar and fill it with the fruit and sugar in layers. Cover them, and set the jar in a kettle of water over the fire. Let them stand in the boiling water all day, filling up the kettle as the water boils away. If at any time they seem likely to ferment, repeat this process; It is a simple and excellent way of preserving plums.

Preserved Pumpkin.—Cut a thick yellow pumpkin, peeled, into strips two inches wide and five or six long. Take one pound of sugar for each pound of pumpkin and scatter it over the fruit, pouring on two wine-glasses lemon-juice to each pound. Next day put the parings of two or three lemons in with the sugar and fruit, and boil the whole three-fourths of an hour, or long enough to make it tender and clear without breaking. Lay the pumpkin to cool, strain the syrup, and pour over the pumpkin.

To Clarify Sugar for Preserving.—For each pound of sugar allow one-half pint water; for every three pounds of sugar the white of one egg. Mix when cold, boil a few minutes, and skim it. Let it stand ten minutes, skim it again, and strain it.

To Preserve Apples.—Weigh equal quantities of good brown sugar and of apples; peel, core, and mince the apples small; boil the sugar, allowing to every three pounds a pint of water. Skim it well and boil it pretty thick; then add the apples, the grated peel of one or two lemons, and two or three pieces of white ginger. Boil till the apples fall, and look clear and yellow. Apples prepared in this way will keep for years.

Citron Melon.—Two lemons to one pound melon, equal weight of sugar for the fruit. Take out the pulp of the melon, cut it in thin slices, and boil in water till tender; take it out, and boil the lemon in the same water twenty minutes; take out the lemon, boil the sugar in the same water, adding a little more water if necessary. When the syrup is clear put in the melon and boil a few minutes.

Raspberry Jam.—Allow a pound of sugar to one pound fruit. Boil the fruit half an hour; strain one-quarter of the fruit and throw away the seeds; add the sugar, and boil the whole ten minutes.

Apple Preserve.—Peel and core two dozen apples, and place them in a jar with three pounds of powdered loaf sugar with a quarter of a pound of ground ginger distributed in layers. Let them remain two whole days, and during half that time let a quarter of a pound of bruised ginger infuse in a pint of boiling water; strain and boil the liquor with the apples for about an hour, skim and take off the fire when quite clear.

To Preserve Cucumbers.—Take firm, ripe cucumbers, as soon as they

turn yellow; pare them, take out the seeds, cut them in pieces two or three inches in length and about two in width; let them lie in weak salt and water for eight hours. Then prepare a syrup of one gallon of cider vinegar, five pounds of sugar, one ounce of mixed spices (not ground spices), boil twenty minutes, then strain. After drying the cucumber with a soft cloth, put it in the syrup, and boil till soft and transparent; skim the pieces out carefully, lay them in a colander to drain; then boil the syrup to the consistency of molasses, pour it on the cucumber, and keep in a cool place.

Preserved Peaches.—To six pounds peaches put six pounds sugar; pare, stone, and quarter the fruit. Put the sugar with the peaches, and let them stand over night; in the morning boil slowly in a preserving-kettle an hour and three-fourths, skimming well.

Preserved Quinces.—Pare and core quinces; take the cores and skins and boil them an hour; then strain the juice through a coarse cloth; boil your quinces in this juice till tender; take them out; add the weight of the quinces in sugar to this syrup; boil and skim till clear; then put in the quinces and boil them three hours.

Preserved Cherries.—Stone them; allow one pound sugar to one pound fruit; put a layer of fruit at the bottom of the preserving kettle; then a layer of sugar, and repeat till all are in; boil till clear. Put in bottles hot, and seal them; keep them in dry sand.

A Nice Dish of Apples for Tea.—Take good tart apples; pare and core them whole, and steam them until perfectly soft: when done, prepare some cream and sugar, flavored with lemon extract, and pour over them. To be eaten while warm.

To Preserve Strawberries.—To one pound of strawberries, after they have been picked over, add one pound of clean sugar; put them in a preserving kettle, over a slow fire, until the sugar is melted, then boil them precisely twenty-five minutes as fast as possible; have your jar ready and put the fruit in boiling hot. The jars should be heated before the hot fruit is poured into it otherwise the jar will break. Cover and seal the jars immediately; set in a cool place.

Apple Charlotte.—Peel, core, and slice one dozen large sized apples, and stew them with half a pound of sugar, one ounce of butter, the peel of one lemon, half a stick of cinnamon, and half-pint of water; continue boiling until the mixture becomes a thick paste. Line the bottom and sides of a mould with thin pieces of bread dipped in clarified butter. Fill the space with the apple marmalade, and cover the whole with a piece of bread dipped in clarified butter. Bake it in a hot oven till it is of a pale brown color, and when done, turn out, and serve in a dish.

Apple Marmalade.—Peel and core two pounds of apples and put them into an enamelled saucepan with half a pint of white wine and one pound of powdered loaf sugar; stew them over a slow fire until the fruit is very soft, and squeeze it through a hair sieve; if not sufficiently sweetened add sugar to taste and put away in jars. It may afterwards be eaten with milk or with cream.

Quince Marmalade.—Rub the quinces with a cloth; cut them in quarters; stew them in a little water till they are tender enough to rub through a sieve: when strained put a pound of brown sugar to a pound of fruit; set it on the fire and let it cook slowly till thick enough to cut smooth.

Barberry Marmalade.—Pick from their stalks two pounds of the finest ripe barberries; put them into an enamelled saucepan with a pint of water; boil them for a few minutes, then pour them out; mash them well, and strain the pulp through a sieve; place this upon the fire, and slowly reduce it: when it is pretty stiff, add sugar in the proportion of weight for weight of the fruit before being dressed; simmer it for a short time, and put it by in glasses when it has grown sufficiently cool.

Cherry Marmalade.—Choose the finest ripe red cherries you can get; stone them, strew sugar over them, mash them well, pass them through a tammy, and simmer them down with an equal weight of fine beaten and

sifted loaf-sugar; do them over a slow fire, and stir them constantly; when a beautiful stiff pulp is formed, turn it into glasses, and keep them carefully covered.

Lemon Marmalade.—Halve the lemons, and squeeze out their juice; boil the remainder in water until soft; take the lemons and remove the pulpy inside; pound the rest, that is so say, the boiled rinds, until they are a paste; add the juice, and pass all through a sieve; add to each pound of the lemons twelve ounces of fine loaf-sugar, beaten and sifted; boil all together for about half an hour, and pour it into jelly-glasses for use. If the lemons are very new and fresh, they may be treated as in orange marmalade—which see.

Preserved Crab-Apples.—Siberian crabs need only be wiped; French crabs should be pared. Make a syrup by boiling two pounds of loaf-sugar with a pint of good cider; prick the apples with a needle, place them in the syrup, and simmer as slowly as possible until you think the crabs are done; place them carefully in jars or glasses; reduce and skim the syrup until it is thick enough, and pour it upon the fruit; cover with wetted skins.

Preserved Pippins.—Pare, core, slice and boil to a jelly a couple of pounds of pippins; strain this; then pare and scoop out the cores of a dozen pippins; make a syrup of two pounds of sugar and a pint of water; put in the apples, with the rind of an orange first blanched. Simmer till the syrup is very stiff; add the pippin jelly, and simmer for some time longer, and when all looks beautifully clear, squeeze in the juice of a lemon.

Apples in Imitation of Ginger.—Take Ribston or Newtown pippins before they are quite ripe; pare, core, and cut them up; pour boiling water over them, and cover them over; boil to a candy height a similar weight of clarified sugar; put the apples into it, after draining them, and stand them by for half an hour, keeping them covered up; then add enough tincture of ginger to make it sufficiently hot, and gently simmer the preserve till it looks clear. Keep it in jars well fastened down.

Preserved Figs.—Get some unripe figs; prick them with a pin; place them on the fire in a saucepan of water with a little alum in it; directly they boil withdraw them from the fire, and when they are somewhat cooled drain and pour upon them a boiling-hot syrup; next day reboil the syrup, put the figs into jars or glasses, fill up with the cold syrup, and tie down securely with skins.

Crab-Apple Marmalade.—When they are ripe, pare, core, and quarter the crab-apples; then slice each quarter as thinly as possible; spread the apple slices upon a cloth, so as to shrivel them slightly; melt down two-thirds their weight of clarified sugar: when this is boiling hot, add the apples; withdraw the saucepan from the fire, and let it stand till its contents are cold; place it over the fire again, and simmer very gently, but do not stir the apples; and when they look nicely clear, pour them into pots, and cover as usual when the preserve is cold. A little cinnamon may be introduced if considered desirable.

Peach Marmalade.—Weigh two pounds of sugar and three pounds and a half of sound ripe peaches; take the stones from the latter; place the fruit in a hair-sieve, and press out the pulp; place this in a preserving-pan with the above quantity of sugar. Do it gently for fifteen minutes; blanch and slice the kernels, add them to the marmalade, give a boil up all together, and put the preserve into pots, moulds or glasses.

Preserved Mulberries.—Put into a preserving-pan sufficient mulberries to yield a pint of juice; strain it; add to it three pounds of refined loaf-sugar in powder; boil and skim it; put into it two pounds of first-rate mulberries: when the syrup is nearly cold put it again upon the fire; bring it slowly to a boil, pour it over the fruit; let it stand till the next day, and again slowly boil it until it will stand in round drops, and the mulberries look beautifully clear. When cold, put them into small pots for use.

Preserved Barberries.—Put into a bain-marie an equal weight of sugar and barberries picked from their stalks: when the fruit is soft enough, put them aside till the following day; then simmer them in a preserving pan for a quarter of an hour, and keep in small jars until wanted.

Tomatoes.—Take them when quite small and green; put them in cold clarified syrup, with an orange, cut in slices, to every two pounds of the tomatoes; simmer them gently, on a slow fire, two or three hours. There should be equal weights of sugar and tomatoes, and more than sufficient water to cover the tomatoes, used for the syrup. Another method of preserving them, which is very nice, is to allow a couple of fresh lemons to three pounds of the tomatoes; pare thin the rind of the lemons, so as to get none of the white part, squeeze out the juice, mix them with cold water sufficient to cover the tomatoes, and put in a few peach leaves, and powdered ginger, tied up in bags. Boil the whole together gently, for three-quarters of an hour; then take up the tomatoes, strain the liquor, and put to a pound and a half of white sugar, for each pound of tomatoes. Put in the tomatoes, and boil them gently, till the syrup appears to have entered them. In the course of a week turn the syrup from them, heat it scalding hot, and turn it on to the tomatoes. Tomatoes preserved in this manner appear like West Indian sweetmeats.

Cherries—Procure cherries that are not quite dead ripe; allow for each pound of cherries a pound of white sugar. Make a rich syrup of the sugar: when it boils, put in the cherries, with the stems on; let them boil till transparent; keep them in glass jars, or wide-mouthed bottles; cork and seal them tight. If you wish to preserve them without the stones, take those that are very ripe; take out the stones carefully, save the juice. Make a syrup of the juice, white sugar, and a very little water; then put in the cherries, and boil them to a thick consistency.

Currants.—Take the currants when ripe and in their prime; let them remain on the stalks, picking off the bad ones. Make a syrup of sugar and very little water, allowing a pound of sugar to each pound of currants, Clarify it; then put in the currants and let them boil a few minutes. In the course of a few days turn the syrup from them, scald it, and turn it back, while hot, on to the currants. Preserved currants mixed with water, is an excellent drink in fevers. Dried currants are also good for the same purpose, if made into a tea.

To Preserve Prunes.—Pour boiling water on the prunes, and set them where they will keep hot, with a lemon, cut in small pieces. When swelled out to nearly the original size, put to each pound of the prunes half a pound of brown sugar, a stick of cinnamon, or a tea-spoonful of powdered cloves, and if there is not sufficient water remaining to cover the prunes, add more, and stew them in the syrup a quarter of an hour. Add, when taken from the fire, a wineglass of wine to every three pounds of the prunes.

Gages.—Allow equal weights of sugar and gages. Make a syrup of white sugar, and just water enough to cover the plums; boil the plums slowly in the syrup ten minutes; turn them into a dish, and let them remain four or five days; then boil them again, till the syrup appears to have entered the plums. Put them in a china jar, and in the course of a week turn the syrup from them, scald it and turn it over them hot.

To Preserve Raspberries.—Strain equal quantities of ripe currants and raspberries, to make a syrup to preserve the raspberries in. Dissolve white sugar in the syrup, by a gentle heat, using a pound of sugar to each pound of syrup and raspberries. When the sugar has dissolved, set the syrup where it will boil about ten minutes; then put it in the raspberries, and let them boil five minutes. In the course of four or five days, turn the syrup from the raspberries; boil it away, so that there will be just enough of it to cover the berries; turn it on them while hot; keep them n wide-mouthed bottles, corked and sealed up tight. Preserved raspberries are very nice to flavor ice creams and blanc mange.

To Preserve Peaches in Brandy.—Procure peaches that are mellow

but not dead ripe; draw a pin round the seam of the peaches, so as to pierce the skin; cover them with French brandy, and let them remain a week; then make a syrup, allowing three-quarters of a pound of brown sugar to a pound of the peaches. Clarify the syrup; then boil the peaches in it; when tender, take them out of the syrup, let it remain till cool; then mix it with the brandy, and turn the whole on the peaches.

Preserved Melon.—Take an unripe green melon, cut it into rather thick slices; peel them, and put them in salt and water for two days; drain them; throw them into boiling water: when rather tender, freshen them by putting them into cold water; then pour boiling hot syrup upon them for four days following; and the last time you do this add more sugar to the syrup, squeeze in the juice of a lemon, and sprinkle the lemon with a little essence of ginger.

Gooseberries Preserved Green.—Choose the largest unripe gooseberries you can find; pick off the black eyes, but leave the stalks; put them into a cold syrup of sugar and water; let them slowly come to a boil. When tender enough, take them out, reduce the syrup until it is very stiff again; put the fruit into it, and do it gently until the syrup is quite ropy. Keep them carefully covered from the air. The gooseberries may be split quarterwise at the top, and the seeds removed if approved of; and instead of water being employed to form the syrup, a jelly may be made by boiling down some green gooseberries, and straining the liquor from them.

Nectarine Marmalade.—Let the fruit be the best and ripest you can obtain. With a very sharp knife first halve the fruit; then remove the stones, and slice the nectarines (skin and all) as thin as possible; sprinkle it with loaf-sugar, beaten and sifted; twelve hours later drain the juice rendered by the fruit, and, with twelve ounces of sugar to a pound of nectarines, put it into a preserving pan: when the sugar is about boiling hot, add the sliced fruit, withdraw it from the fire; and when cold, simmer it for ten minutes without stirring it, and put it into small jars for keeping.

Pineapple Marmalade.—Make choice of a ripe, sound pineapple; halve it and scrape the flesh off it with a knife until it is quite a pulp; weigh this, and to each half-pound add the strained juice of a lemon and six ounces of loaf-sugar, beaten and sifted; put all together into an enamelled saucepan, stir it over a clear but not fierce fire, and when it is well stiffened pour it into sweatmeat-glasses for serving. It requires to be done rather quickly, so as to preserve the color and the flavor of the fruit.

Pear Marmalade.—To 6 lbs. of small pears, take 4 lbs. of sugar; put the pears into a saucepan, with a little cold water; cover it, and set it over the fire until the fruit is soft; then put them into cold water, pare, quarter, and core them; put to them three tea-cups of water, set them over the fire; roll the sugar fine, mash the fruit fine and smooth, put the sugar to it, stir it well together until it is thick, like jelly; then put it in tumblers or jars, and when cold secure it as jelly.

Raspberry Jam.—Allow a pound of sugar to a pound of fruit; mash the raspberries and put them, with the sugar, into your preserving-kettle. Boil it slowly for an hour, skimming it well; tie it up with brandy paper. All jams are made in the same manner.

Covering for Preserves.—To one part of mutton tallow, take two parts of beeswax; melt them together; dip a cotton cloth in the mixture and spread it quickly over the jar.

Peach Jam.—Inferior peaches, and those that are not fully ripe, are best preserved in the following manner: Pare and halve them, and take out the stones; lay the peaches in a deep dish, and to each layer of peaches put a layer of brown sugar; three-quarters of a pound of sugar to a pound of the peaches, is sufficient. Let the peaches remain until the next day; then put them on a moderate fire, without any water, and let them stew slowly about twenty minutes. Peaches preserved in this way, are very nice for puffs.

To Clarify Syrup for Sweetmeats.—Put your sugar into the preserving-kettle; turn in the quantity of cold water that you think will be

sufficient to cover the fruit that is to be preserved in it. Beat the whites of eggs to a froth, allowing one white of an egg to three pounds of sugar; mix the whites of the eggs with the sugar and water, set it on a slow fire, and let the sugar dissolve; then stir the whole up well together, and set it where it will boil. As soon as it boils up well, take it from the fire, let it remain for a minute; then take off the scum; let it back on the fire, and let it boil a minute; then take it off, and skim it again. This operation repeat till the syrup is clear; put in the fruit when the syrup is cold. The fruit should not be crowded while preserving, and if there is not syrup enough to cover the fruit, take it out of the syrup, and put in more water, and boil it with the syrup before putting back the fruit.

French Honey.—White sugar 1 lb.; 6 eggs, leaving out the whites of 2; the juice of 3 or 4 lemons, and the grated rind of 2, and ½ lb. of butter; stir over a slow fire until it is of the consistency of honey.

Imitation Apple Butter.—Vinegar 1 qt., cheap molasses 1 qt.; mix together, set over the fire till it commences to cook; take it off, add 10 tablespoonfuls of wheat flour, and cold water to make a batter; then add 1 qt. scalding water, stir and cook for fifteen minutes.

Molasses Preserves—Boil 1 qt. of molasses about ten or fifteen minutes to a thickish consistency; then add 6 eggs well beaten, and a spoonful of flour. Boil a few minutes longer, stirring constantly; then set off the fire, and flavor with lemon or allspice as desired.

Strawberry, Raspberry, and Blackberry Jelly.—Jellies of these fruits are all made in the following manner: Take the berries when ripe, and in their prime, mash them, and let them drain through a flannel bag, without squeezing it. To each pint of juice, put a pound of white sugar, and the beaten white of an egg to three pounds of the sugar. Set it on the fire. When it boils up well, take it from the fire, and skim it clear. Set it back on the fire; if any more scum rises, take it from the fire, and skim it clear Boil it till it becomes a jelly, which is ascertained by taking a little of it up into a tumbler of cold water. If it falls to the bottom in a solid mass, it is sufficiently boiled.

Cranberry, Grape, and Currant Jelly.—They are all made in the same manner. Take the fruit in its prime, wash and drain it till nearly dry; then put it in an earthen jar, or pot, and set the pot in a kettle of hot water. Set the kettle where the water will boil, taking care that none of it gets into the jar. When the fruit breaks, turn it into a flannel bag, and let it drain slowly through, into a deep dish, without squeezing: when the juice has all passed through the bag, put to each pint of it a pound and a half of white sugar. Put to each quart of the syrup the beaten white of an egg. Set the syrup where it will boil gently; as fast as any scum rises, take the syrup from the fire, and skim it clear. When the jelly has boiled fifteen or twenty minutes, try a little of it in a tumbler of cold water; if it sinks to the bottom of the tumbler in a solid lump, it is sufficiently boiled. Jellies are improved by being put in the sun for several days. Care must be taken that the dew does not fall on them.

Quince Jelly.—Halve the quinces and take out the cores. Boil the quinces till very soft, in clear water, mash them, and let them drain through a flannel bag, without squeezing them. Put to the quince liquor, when drained through the bag, white sugar, in the proportion of a pound to a pint of the liquor. Add the whites of eggs, and clarify it: when clear, boil it on a moderate fire, till it becomes a thick jelly: fill glasses with the jelly, and cover them tight. The quince pulp that remains in the jelly-bag can be made into marmalade.

Hartshorn Jelly.—Boil four ounce of hartshorn shavings in a couple of quarts of water, till it becomes a thick jelly; then strain and put to it the juice and rind of a couple of lemons, a wineglass of white wine, and a stick of cinnamon. Wash four fresh eggs, wipe them dry, separate the whites from the yolks, beat the whites to a froth, bruise the shells, and mix them with hartshorn. Set the whole on a moderate fire; sweeten it to the taste

when hot. Boil it till it becomes quite thick; then let it drain through a jelly-bag till clear.

Raspberry and Blackberry Jam.—For each pound of berries, allow a pound of sugar. Put a layer of each alternately in a preserving dish; let them remain half an hour; then boil them slowly, stirring them frequently to keep them from burning. When they have boiled half an hour, take a little up in a cup, and set it in a dish of cold water: if it appears of the consistency of thick jelly take the whole from the fire; if not, boil till it becomes so.

Apple Jelly.—Peel, core, and slice very thin six fine apples; boil them in a quart of water, until a fourth part is consumed; strain off and add one pound of sugar and half a stick of cinnamon; boil the whole until moderately thick, add a quarter of a pound of isinglass, strain it off repeatedly until quite clear, and then put up in jars. Calf's foot jelly may be used instead of isinglass.

Table Jellies.—Use at least two ounces of isinglass, which should be first soaked in cold water for two hours, drain off the water; then take two quarts of cold water, one and a half pounds of sugar, put in the white of three eggs, the juice of three good sized lemons, the peel of one stick of cinnamon, a little nutmeg or an orange peel, or other spice to suit the taste; stir all the ingredients well together while cold; then boil the whole mass five or ten minutes, and then pour it through a jelly-bag, when it may be put into glasses or moulds, and when cold will be fit for use. The moulds should be wet with a little white of egg and water just before the jelly is put in them in order to make it easy to turn out on plates. Add one pint of wine for wine jelly, or any liquor that is convenient to flavor with.

Blackberry Jelly.—This preparation of the blackberry is more agreeable than the jam, as the seeds, though very wholesome, are not agreeable to all. It is made in the same way as currant jelly; but the fruit is so sweet that it only requires half the weight of the juice in sugar.

Wine Jelly.—Take 1 pt. water and 3 oz. isinglass, 1¼ lbs. sugar, the juice of 2 lemons, and dissolve that and let it come to a boil, then add wine, brandy and spice to your taste, and strain it through a cotton or flannel cloth and put it in moulds to cool.

Ivory Jelly.—Put half a pound of ivory powder into three pints of cold water, let it simmer until reduced to a pint and a half; when cold, take the jelly carefully from the sediment; add to it the juice of a lemon, half the peel, two or three cloves, and sugar to taste; warm it till quite dissolved, then strain it.

Currant Jelly without Cooking.—Press the juice from the currants, and strain it; to every pint put a pound of fine white sugar; mix them together until the sugar is dissolved; then put it in jars, seal them and expose them to a hot sun for two or three days.

Black-Currant Jelly.—Get your black currants when fully ripe, put them in a preserving-pan over a slow fire, mash them well till they are nearly boiling, take them off, and squeeze what juice you can through a sieve; to every pint of juice put one pound and a quarter of loaf sugar powdered; put it over a brisk fire in your preserving-pan: when it boils up skim it; let it boil about ten minutes; try if it will jelly, by dropping a drop or two on a plate: if it will not, boil it till it will; then pour it into your pots and glasses, let them stand till cold; dip paper in brandy, and cover it over them; tie another paper over the top; keep it in a dry place.

Red Currrant-Jelly.—The currants for this purpose should be gathered in the dry, when fully ripe; pick and put them in a preserving-pan, over a slow fire, to draw the juice out, which you must pour away from them as it comes, or it will paste: when you have got what juice you can from them pass it through a flannel bag to take out the thickness: then, to every pint of juice, put one pound and a quarter of loaf sugar, broken small; put it over a brisk fire in a preserving-pan: when the scum rises, take it off with a spoon, boil your jelly about ten minutes; try if it will jelly by dropping a little on a cold plate: if it will not, boil it till it will; then pour it into your

pots and glasses ; let it stand about two days ; then put paper dipped in brandy, on the top of the jelly and skin over the pots or glasses. Keep in a dry place.

Calves'-foot Jelly.—Chop up two calves' feet, put them on with about four quarts of water to boil. This should be done the day before you require the jelly ; keep it well skimmed and boil gently all day ; it will then be reduced to about two quarts : the next morning take off all the grease and wash the top with a little warm water ; then rinse it with cold ; place the stock in the proper-sized stewpan to allow it to boil well ; then put in a paring of lemon, without any white adhering to it, two or three cloves, a piece of cinnamon, a few bruised coriander seeds, a bay leaf ; let it boil for a few minutes, and then take it off to get cool. Have ready broken in a bowl six or eight whites of eggs and the shells ; chop them up together, squeeze five or six lemons, strain the juice ; add sugar to the whites of eggs, and a glass of cold water, then add the lemon juice ; add all this well mixed to the calves'-foot stock, place it on the fire and let it rise to the top of your stew-pan, being careful it does not go over ; then take it from the fire, place on the cover, and put some hot coals upon it ; let it be still a few minutes, and then run it repeatedly through the jelly-bag till beautifully bright and clear. Flavor with whatever is desired.

Cherry Jelly.—Having taken the stalks and stones from two pounds of dark red fleshy cherries ; put them in a basin, pound the kernels, and squeeze the juice of four lemons through a tammy ; mash the cherries with a wooden spoon, putting first in half a pot of currant jelly ; then the kernels, lastly the lemon juice, and mix these well together ; then having boiled and skimmed a pint of clarified sugar and isinglass, put the cherries into a jelly-bag, pour the sugar, &c., over them, and run it through till quite clear : if not sufficiently sweet add more sugar, if the contrary, add more lemon-juice. Wet the mould, set it in ice, and fill it with the jelly, but do not turn it out till the last minute.

Lemon Jelly.—Set a pint and a half of clarified sugar on the fire, and dilute it with a little water : when it boils and has been well skimmed, put in two ounces of clarified isinglass with a little lemon peel cut very thin ; let these boil till you have squeezed through a sieve into a basin the juice of six lemons ; then pass your sugar and isinglass to it, and set it in a mould like other jellies. When turned out, garnish with dried jellies.

Rum Jelly.—To a quart bottle of common white wine, add a pound of lump sugar reduced to syrup and clarified ; then take an ounce of isinglass, dissolve it thoroughly, strain it through a sieve, and mix it with the syrup milk warm : when this mixture is nearly cold, pour it into the white wine, mix it by stirring it well ; then add a spoonful, or more if desired, of old Jamaica rum ; stir it and pour it into a mould, or glasses, if intended for evening parties.

Jellies.—*Lemon Jelly.*—Isinglass, 2 oz. ; water, 1 qt. ; boil ; add sugar, 1 lb. ; clarify, and when nearly cold add the juice of 5 lemons, and the grated yellow rinds of 2 oranges and 2 lemons ; mix well, strain off the peel, and put it into glasses or bottles. *Hartshorn Jelly.*—Hartshorn, 1 lb. ; water, 1 gal. ; peel of 2 lemons ; boil over a gentle fire till sufficiently thick ; strain and add loaf sugar, ½ lb. ; whites of 10 eggs beaten to a froth ; juice of 6 lemons : mix well together ; then bottle. *Isinglass Jelly.*—Put 4 oz. isinglass and 2 oz. cloves into 1 gal. water ; boil it down to half a gal. ; strain it upon 4 lbs. of loaf sugar ; add, while cooling, a little wine ; then bottle. *Apple Jelly from Cider.*—Take of apple juice, strained, 4 lbs. ; sugar, 2 lbs. ; boil to a jelly, and bottle. *Gooseberry Jelly.*—Sugar, 4 lbs. ; water. 2 lbs. ; boil together : it will be nearly solid when cold ; to this syrup, add an equal weight of gooseberry juice ; give it a short boil, cool ; then pot it. *Currant Jelly.*—Take the juice of red currants, and loaf sugar, equal quantities ; boil and stir gently for three hours ; put it into glasses, and in three days it will concentrate into a firm jelly. *Tapioca Jelly.*—Wash 8 oz. of tapioca well ; then soak it in 1 gal. fresh water, 5 or 6 hours ; add the peels of 8 lem-

ons, and set all on to heat; simmer till clear. Add the juice of the 8 lemons with wine and sugar to taste; then bottle.

Moss Jelly.—Steep Carragua, or Irish moss, in cold water a few minutes, to extract the bitter taste; then drain off the water, and to half an ounce of moss put a quart of fresh water, and a stick of cinnamon. Boil it till it becomes a thick jelly; then strain it, and season it to the taste with white wine and white sugar. This is very nourishing, and recommended for consumptive complaints.

Sago Jelly.—Rinse four ounces of sago thoroughly; then soak it in cold water half an hour; turn off the water, and put to it a pint and a half of fresh cold water. Let it soak in it half an hour; then set it where it will boil slowly, stirring it constantly; boil with it a stick of cinnamon.

Isinglass Blanc Mange.—Pull an ounce of mild white isinglass into small pieces; rinse them, and put to them a quart of milk if the weather is hot, and three pints if it is cold weather. Set it on a few coals; stir it constantly till the isinglass dissolves; then sweeten it to the taste with double refined loaf sugar, put in a small stick of cinnamon, a vanilla bean, or blade of mace. Set it where it will boil five or six minutes, stirring it constantly. Strain it, and fill the moulds with it—let it remain in them till cold. The same bean will do to use several times.

Rice Blanc Mange.—Boil a tea-cup of rice in a pint of water, with a blade of mace, and a tea-spoonful of salt: when it swells out and becomes dry, add sufficient milk to prevent its burning. Let it boil till quite soft, stirring it constantly to keep it from burning; sweeten it with white sugar. Dip your moulds in cold water; then turn in the rice, without drying the moulds; let the rice remain in the moulds till it becomes quite cold.

Calf's Feet Blanc Mange.—Boil four feet in five quarts of water, without any salt: when the liquor is reduced to one quart, strain and mix it with one quart of milk, several sticks of cinnamon, or a vanilla bean. Boil the whole ten minutes, sweeten it to the taste with white sugar, strain it, and fill your moulds with it.

Rice Flour Blanc Mange.—Mix four tablespoonfuls of ground rice, smoothly, with half a pint of cold milk; then stir it into a quart of boiling milk. Put in the grated rind of a lemon, and half the juice, a blade of mace; sweeten to the taste with white sugar. Boil the whole seven or eight minutes, stirring it frequently; take it from the fire when cool, put in the beaten whites of three eggs, put it back on the fire, stir it constantly till nearly boiling hot; then turn it into moulds, or deep cups, and let it remain till cold. This is nice food for invalids.

Almond Blanc Mange.—Take four ounces of almonds, six oz. sugar; boil together with a quart of water, melt in this two ounces of pure isinglass, strain in a small tin mould to stiffen it. When wanted, dip the mould in hot water, and turn it out.

Lemon Blanc Mange.—Pour a pint of hot water upon half an ounce of isinglass: when it is dissolved, add the juice of three lemons, the peel of two lemons grated, six yolks of eggs beaten, and about a good wineglass of Madeira wine to it; sweeten to your taste; let it boil; then strain it and put it in your moulds.

New Jersey Blanc Mange.—In three pints of sweetened cream (or milk) put one ounce Russia isinglass until dissolved; then boil it well: it will not taste so rich if only scalded; flavor and strain into a pitcher; stand the pitcher where it will keep hot, and all the sediment will settle; pour carefully into forms, that the sediment may not darken the ornaments. If peach water or almond is used for flavoring put it in after boiling. The peel of a lemon and stick cinnamon, boiled together in milk is very pleasant.

Charlotte Russe.—One pint of milk, three-quarters pound sugar, one-half box gelatine: put these together; set it on a kettle of boiling water; After the gelatine is dissolved, beat four eggs and stir in; leave it on the fire until it looks clear; then let it cool. Beat to a stiff froth one pint of cream; season with vanilla; set it in a cool place, with snow or ice around

it. When you add the eggs, stir thoroughly all the time; after it is cool, give it a hard beat; line a dish with cake; pour in the mixture, and put cake over the top.

Apple Cream.—Peel a dozen and a half large apples and boil them to a pulp, then add two pounds of powdered loaf sugar and the whites of three eggs; mix thoroughly together and serve when cold in a dish.

Orange Cream.—Beat the yolks of eight eggs, and the whites of two, to a froth; then stir in half a pound of powdered white sugar; add half a pint of wine, and the juice of six fresh oranges, and the juice of one lemon. Flavor it with orange-flower water; strain it, and set it on a few coals; stir it till it thickens; then add a piece of butter, of the size of a nutmeg. When the butter has melted, take it from the fire, continue to stir it till cool; then fill your glasses with it. Beat up the whites of the eggs to a froth, and lay the froth on top of the glasses of cream.

Snow Cream.—Beat the whites of four eggs to a stiff froth; then stir in two table-spoonfuls of powdered white sugar, a table-spoonful of sweet wine, a teaspoonful of rose water. Beat the whole together; then add a pint of thick cream. This is a nice accompaniment to a dessert of sweetmeats.

Ice Creams.—Sweeten thick rich cream with powdered white sugar: it should be made very sweet, as the process of freezing extracts a great deal of the saccharine matter. Essence of lemon, the juice of strawberries or pine-apples, are nice to flavor the cream with: the juice should be sweetened before.

Ice Cream.—Take one quart of sweet milk and cream, two eggs, one teacupful of white sugar, one teaspoonful of flour stirred in a quarter teacupful of sweet milk. Flavor to your liking; put your milk into the freezer, or, if you have no freezer, a three-quart pail is as good, and set it into a kettle of boiling water, stirring the milk frequently, so that it will not burn; beat the eggs, and when the milk boils, stir them into the milk; take it out of the water; put into the milk the sugar, flour, and flavoring; put the ice into a bag and pound it into lumps the size of a hickory nut; put a layer of ice into a small tub, or whatever you wish to freeze it in, and a thin layer of salt; put your freezer or pail into the tub, and then put a layer of ice and layer of salt alternately around it; stir the cream, which will freeze, from the sides with a spoon; stir it frequently until it is frozen. If you make it as directed, you will not fail of having excellent ice-cream.

Ice Cream with Fruit.—1 pound of preserved fruit; 2 lemons; 1 quart of cream; cochineal.

Squeeze the juice of the lemons into some sugar to taste; then pass all through a sieve, and if raspberry, or strawberry, or any other ripe fruit, add a little cochineal, to heighten the color. Have the freezing-pot nice and clean; put the cream into it, and cover it; then put the pot into the tub with the ice beat small, and some salt; turn the freezing-pot quick, and as the cream sticks to the sides, scrape it down with an ice-spoon, and so on until it is frozen. The more the cream is worked to the side with a spoon, the smoother and better it will be flavored. After it is well frozen, take it out and put it into ice shapes with salt and ice; then carefully wash the shapes with salt and ice; then carefully wash the shapes for fear of any salt adhering to them; dip them in lukewarm water, and send to the table. Fresh fruit, strawberries, or raspberries are nice, but more sugar will be necessary.

Lemon Cream.—Take a pint of thick cream, and put to it the yolks of two eggs, well beaten, four ounces of fine sugar, and the thin rind of a lemon; boil it up; then stir till almost cold; put the juice of a lemon in a dish or bowl and pour the cream upon it, stirring till quite cold.

Fruit Creams.—Take a half an ounce of isinglass dissolved in a little water; then put one pint of good cream, sweetened to the taste; boil it: when nearly cold lay some apricot or raspberry jam on the bottom of a glass dish and pour it over. This is most excellent.

Cream, Whipped.—Sweeten with powdered loaf sugar a quart of cream,

and add to it a lump of sugar which has been rubbed upon the peels of two lemons, or flavor it with orange-flower water, or any other agreeable essence. Whisk the cream thoroughly in a large pan, and as the froth rises, take it off, lay it upon a sieve placed over another pan, and return the cream which drains from the froth, till all is whisked; then heap it upon a dish, or put it into glasses. Garnish with thinly pared citron, cut into any fanciful shape, and serve.

Raspberry Cream.—Whisk the white of an egg to a strong froth; then add half a pint of cream, and a small piece of loaf sugar; whisk all together, till the froth rises; take it off with a spoon, laying it on a hair-sieve to drain; then mix two or three tablespoonfuls of raspberry-jam with as much cream as you want; pass it through a sieve to take the seeds out; sweeten it to your palate; fill your glasses three parts full; then put on the froth as high as it will stand. Keep them in the cold.

Gherkins.—Put them in strong brine; keep them in a warm place. When they turn yellow, drain off the brine, and turn hot vinegar on them. Let them remain in it till they turn green, keeping them in a warm place; then turn off the vinegar. Add fresh scalding hot vinegar, spiced with mace, allspice, and peppercorns; add alum and salt, in the same proportion as for cucumbers.

To Pickle Oysters.—Take the oysters from the liquor, strain and boil it. Rinse the oysters, if there are any bits of the shells attached to them; put them into the liquor while boiling. Boil them one minute; then take them out of it, and to the liquor put a few peppercorns, cloves, and a blade or two of mace; add a little salt, and the same quantity of vinegar as oyster juice. Let the whole boil fifteen minutes, then turn it on to the oysters. If you wish to keep the oysters for a number of weeks, bottle and cork them tight as soon as cold.

To Pickle Mushrooms.—Peel and stew them, with just water enough to prevent their sticking at the bottom of the pan. Shake them occasionally, to prevent their burning. When tender, take them up, and put them in scalding hot vinegar, spiced with mace, cloves, and peppercorns; add a little salt. Bottle and cork them tight if you wish to keep them long.

Pickled Peaches.—Take a gallon of good vinegar, and add to it four pounds of sugar; boil for a few minutes and remove any scum that may arise; then take cling-stone peaches that are fully ripe, rub them to get off the down, and stick three or four cloves in each peach; put them into a stone jar, and pour the liquor, boiling hot, over them. Cover the jar closely, and set it in a cool place for a week or two; then pour off the liquor and boil it as before; after which return it to the peaches, boiling hot which should be carefully covered and stored away for future use.

Pickled Peaches.—Seven pounds peeled peaches stuck with cloves; three and one-half pounds sugar, one-half gallon vinegar; scald and pour on the peaches. Let it stand nine days; then cook twenty minutes.

Peaches and Apricots.—Take those of a full growth, but perfectly green; put them in salt and water strong enough to bear up an egg. When they have been in a week, take them out, and wipe them carefully with a soft cloth. Lay them in a pickle jar. Put to a gallon of vinegar half an ounce of cloves, the same quantity of peppercorns, sliced ginger and mustard seed; add salt, and boil the vinegar; then turn it on to the peaches scalding hot. Turn the vinegar from them several times. Heat it scalding hot, and turn it back while hot.

Chow-chow.—One peck green tomatoes, half a dozen peppers, one dozen onions, grated horseradish if you please; chop, and scald in salt and water; drain in a sieve, put into jars, and then pour spiced vinegar over it.

To Pickle Ripe Tomatoes.—To one gallon ripe tomatoes peeled add two tablespoonfuls mustard, two tablespoonfuls black pepper, two tablespoonfuls allspice, one tablespoonful salt, one tablespoonful cloves. All the seasoning must be ground; cover them with vinegar; let them scald, but not boil, three hours.

Spiced Currants.—Five pounds ripe currants, four pounds brown sugar, two tablespoons cloves, two tablespoons cinnamon, one pint vinegar. Boil two hours, or more, till quite thick.

To Pickle Butternuts and Walnuts.—The nuts for pickling should be gathered as early as July, unless the season is very backward. When a pin will go through them easily, they are young enough to pickle. Soak them in salt and water a week; then drain it off. Rub them with a cloth, to get off the roughness. To a gallon of vinegar put a teacup of salt, a tablespoonful of powdered cloves and mace, mixed together, half an ounce of allspice and peppercorns. Boil the vinegar and spices, and turn it while hot on to the nuts. In the course of a week, scald the vinegar, and turn it back on them while hot. They will be fit to eat in the course of a fortnight.

Pickled Cauliflowers.—Cook the cauliflower till tender; put it in jars; then pour vinegar and ground mustard, previously scalded together, over them.

Pickled Plums.—For eight pounds of fruit take four pounds sugar, two quarts of vinegar, and one ounce of cloves. Boil the sugar, vinegar, and cloves; skim and pour them, scalding hot, over the fruit, and let it set three days; then pour off the syrup, and scald, skim, and pour over again. Continue this process every three days, till you have scalded three times, after which it will be fit for use.

Green Tomato Pickle.—One peck tomatoes, eight green peppers, to be chopped fine and soaked twenty four hours in weak brine; then skim out, and add one head of cabbage chopped fine; scald in vinegar twenty minutes; skim it out and put it into the jar, and add three pints of grated horseradish and spices as you please. Pour cold vinegar over the whole.

Pickle Cherries.—To eight pounds of cherries (after the stones and stems have been removed) take four pounds of clean sugar, a handful of cloves; put into the preserving kettle and boil slow until the sugar is melted, then boil fast until the juice is clear. Just before removing it from the fire, add half a pint of good vinegar.

Pickle for Beef.—For one hundred pounds of beef take three quarts of salt, half a pound of brown sugar, and two ounces of ground black pepper; mix in water enough to cover the meat; let it boil; take off the scum; when cool, pour it over the meat. Salted beef should be all used up by the first of May, as it does not keep well in warm weather.

To Pickle Onions.—Put a sufficient quantity into salt and water, for nine days, observing to change the water every day; next put them into jars, and pour fresh boiling salt and water over them; cover them close up till they are cold; then make a second decoction of salt and water, and pour it on boiling. When it is cold, drain the onions on a hair sieve, and put them into wide-mouthed bottles; fill them up with distilled vinegar; put into every bottle a slice or two of ginger, a blade of mace, and a teaspoonful of sweet oil, which will keep the onions white; cork them up well in a dry place.

Mushrooms.—Put the smallest that can be got into spring-water, and rub them with a piece of new flannel, dipped in salt. Throw them into cold water as they are cleaned, which will make them keep their color; next put them into a saucepan, with a handful of salt upon them. Cover them close and set them over the fire four or five minutes, or till the heat draws the liquor from them; next lay them betwixt two dry cloths till they are cold; put them into glass-bottles, and fill them up with distilled vinegar, with a blade of mace and a teaspoonful of sweet oil into every bottle; cork them up close, and place them in a dry, cool place. As a substitute for distilled vinegar, use white wine vinegar, or ale; alegar will do, but it must be boiled with a little mace, salt, and a few slices of ginger, and it must be quite cold before it is poured upon the mushrooms.

Curry Powder.—Mix an ounce of ginger, one of mustard, one of pepper, three of coriander seed, the same quantity of turmeric, a quarter of an ounce of cayenne pepper, half an ounce of cardamums, and the same of

cummin seed and cinnamon. Pound the whole fine, sift, and keep it in a bottle corked tight.

Oyster Catsup.—Take fine fresh oysters, rinse them in their own liquor, then pound them in a marble mortar, and to a pint of oysters put a pint of sherry wine; boil them up, add an ounce of salt, 2 drachms of cayenne pepper, let it boil up once again; rub it through a sieve. When cold, put it in bottles and cork and seal them.

Tomato Catsup.—Take one bushel of tomatoes and boil them until they are soft; squeeze them through a fine wire sieve and add three half pints of salt, two ounces of cayenne pepper, three tablespoonfuls of black pepper and five heads of garlic, (or onions,) skinned and separated. Mix together and boil about three hours, or until reduced to about one-half; then bottle without straining.

Worcestershire Sauce.—White vinegar 15 gals.; walnut catsup 10 gals.; Maderia wine 5 gals.; mushroom catsup 10 gals.; table salt 25 lbs.; Canton soy, 4 gals.; powdered capsicum 2 lbs.; powdered allspice 1 lb.; powdered coriander seeds, 1 lb.; cloves, mace, and cinnamon, of each ½ lb.; assafœtida ¼ lb; dissolved in brandy 1 gal. Boil 20 lbs. hogs' livers in 10 gals. of water for 12 hours, renewing the water from time to time. Take out the liver, chop it, mix with water, work through a sieve, and mix with the sauce.

A Quick Way to Pickle Pepper.—Take one hundred peppers; put three half pints of salt and as much scalding water as will cover them. It is best to put a weight over to keep them under the water. Let them remain in the salt and water two days, and then take them out and let them dry; make a small opening in the side to let the water out; wipe them, put them in a stone jar, with half an ounce of cloves, half an ounce of allspice, and a small lump of alum. Cover them with cold vinegar; when done in this way they will not change color.

Stewed Mushrooms.—Take off the skins and ends of the stalks; wash clean; put them in a pan without water, except what adheres to them; season with pepper and salt, place them over the fire to cook slowly. Add butter; serve them hot.

Cucumber, Properties of.—This esculent is chiefly characterized by its cooling and aperient qualities. For persons with strong stomachs they are not unwholesome; but where the organs of digestion are at all impaired, they are most injurious, as they lie cold and heavy on the stomach, and cause frequent and violent eructations and flatulency. In any case they should never be eaten without plenty of pepper, and an admixture of vinegar and oil. When cooked and stewed with gravy, they are much more wholesome than in their raw state.

Pickled Cucumbers.—Wash the cucumber clean; make a pickle of water and salt strong enough to float an egg, pour it over them, put a weight on the top to keep the cucumbers under the brine, and let them stand eight or nine days; then take them out, and wash in fresh water, milk-warm; line your kettle with cabbage leaves, put in your pickles, and as much vinegar and water mixed, about half-and-half, as will cover them nicely; cover the kettle up, hang them over a slow fire. Let the water get hot, but do not let it simmer, as that would soften them; when they are perfectly green, take them and let them drain; wipe dry, put in small jars with cloves and allspice, and a few small onions. A piece of alum in each jar will keep them hard; then cover your pickles with strong cider vinegar, tie them close and keep them in a dry place; by adding some white sugar you will find a great improvement.

Cold Slaw.—Get a fresh cabbage, take off the outside leaves, cut it in half, take a knife and cut it fine, put it in a dish, then put on the dressing prepared in the following manner:—

Beat up three eggs, add to them one gill of good vinegar and one gill of water; when it begins to thicken stir in a piece of butter the size of a hickory nut, a teaspoonful of salt and a large spoonful of white sugar; when

cold pour it over the cabbage and stir it together. Before sending to table sprinkle with black pepper.

COOKERY FOR THE SICK.

Barley Water.—Boil a couple of ounces of barley in two quarts of water till soft; pearl barley is the best, but the common barley answers very well, when soft, strain and mix it with a little currant jelly, to give it a pleasant, acid taste. If the jelly is not liked, turn it, when boiled soft, on to a couple of ounces of figs or raisins, and boil it again till reduced to one quart; then strain it for use.

Rice Gruel.—Put a large spoonful of unground rice into six gills of boiling water, with a stick of cinnamon or mace. Strain it when boiled soft, and add half a pint of new milk; put in a teaspoonful of salt, and boil it a few minutes longer. If you wish to make the gruel of rice flour, mix a tablespoonful of it, smoothly, with three of cold water, and stir it into a quart of boiling water; let it boil five or six minutes, stirring it constantly. Season it with salt, a little butter, and add, if you like, nutmeg and white sugar to your taste.

Water Gruel.—Mix a couple of tablespoonsful of Indian meal with one of wheat flour, and sufficient cold water to make a thick batter. If the gruel is liked thick, stir it into a pint of boiling water; if liked thin, more water will be necessary. Season the gruel with salt, and let it boil six or eight minutes, stirring it frequently; then take it from the fire, put in a piece of butter of the size of a walnut, and pepper to the taste. Turn it on toasted bread, cut in small pieces.

Caudle.—Make rice or water gruel, as above; then strain it, and add half a wineglass of ale, wine, or brandy. Sweeten with loaf-sugar, and grate in a little nutmeg.

Arrowroot Custards.—Boil a pint of milk, and stir into it while boiling a tablespoonful of arrowroot, mixed smooth, with a little cold milk. Stir it in well, and let the whole boil three or four minutes; take it from the fire to cool: when so, stir in a couple of beaten eggs, sweeten it to the taste, and grate in a small piece of nutmeg; set the whole where it will boil, stirring it constantly. As soon as it boils up, take it from the fire, and turn it into custard cups. The arrowroot is prepared in the same manner as for the custards, omitting the sugar, spice, and eggs: is excellent food for invalids, and can be eaten when the custards are too rich for the stomach.

Wine Whey.—Stir into a pint of boiling milk a couple of glasses of wine. Let it boil a minute; then take it from the fire, and let it remain till the curd has settled; then turn off the whey, and sweeten it with white sugar.

Stomachic Tincture.—Bruise a couple of ounces of Peruvian bark, one of bitter dried orange peel. Steep them in a pint of proof spirits a fortnight, shaking up the bottle that contains it once or twice every day. Let it remain untouched for a couple of days.

Hominy.—Take two pounds of fine hominy, wash it well, let it soak in cool water for one hour; strain the water off; put in saucepan with water to cover it, set on the fire to boil for two hours. You can add good milk if you like, and salt to your taste.

Tea.—Scald the tea-pot, and if the tea is a strong kind, a teaspoonful for a pint of water is sufficient—if it is a weak kind, more will be required. Pour on just enough boiling water to cover the tea and let it steep. Green tea should not steep more then five or six minutes before drinking; if steeped longer, it will not be lively. Black tea requires steeping ten or twelve minutes to extract the strength.

Chocolate.—Scrape the chocolate off fine, mix it smooth with water; if

liked very rich, make the chocolate entirely of milk—if not, use half water. Boil water and milk together; then stir in the chocolate, previously mixed with water; stir it till it boils, then sweeten it to your taste, and take it up. If liked rich, grate in a little nutmeg. A tablespoonful of chocolate to a pint of water or milk, is about the right proportion.

Egg Caudle.—Beat an egg up well, first by itself, and then in a pint of thin, cold gruel. When well mixed, put it in a saucepan with a little wine or brandy, and a little of any spice preferred, and stir this over the fire till it thickens; be very careful, though, that it does not boil up.

Water Arrowroot.—Mix in a breakfast cup or broth basin one *large* dessertspoonful of arrowroot, in two or three tablespoonfuls of cold water till quite smooth. Then pour quickly on it boiling water, stirring it rapidly at the same time till the arrowroot is of the thickness required; after which, sweeten it with sifted sugar, and flavor it with a teaspoonful of brandy, or a glass of white wine.

Egg Wine (Cold).—Beat an egg up well in a tumbler with a wineglass of cold water, and a glass of sherry. Add sifted sugar to your taste, and drink when all is thoroughly beaten up and frothy.

Egg and Milk.—Beat up well the yolk of an egg in a breakfast cup; when quite frothy, stir into it a cup of *hot* milk, but *not boiling*. Sweeten to your taste, and grate a little nutmeg on the top.

Lemonade.—Take three lemons. Pare off the rind very thinly, then cut them into slices, taking out the seeds, and cutting off most of the white pith. Put the slices, and peel into a jug with about two or three ounces of loaf sugar (more, if liked), and pour over them one pint of boiling water. Cover it closely till cold, and then strain for use.

This may be made more or less acid, according to taste.

Panada.—Put half a pint of water, a wineglass of sherry, a little loaf sugar and grated nutmeg in a clean saucepan on the fire, and let it boil up. As soon as it boils, put in just enough very finely-grated bread crumbs to thicken the whole to about the consistence of gruel. Keep it boiling very fast until it is of a proper thickness to drink.

A little grated lemon-peel may be added also to flavor, if liked.

Essence of Meat (*Very Strong*).—Take one or two pounds of the very *best* part of a round of beef. Cut it up small, but do not mince it, throw a *little* salt over it, and then put it into a stone jar. Put this into a stewpan of water and let it *simmer* only on the fire for twenty-four hours. At the end of this time the meat will be reduced to a liquid, with the exception of a few small strings. Strain and season it, and give a very small teacup of it *hot* once or twice a day. The cup should be set in a broth basin with a cover, with *hot* water round it to warm it.

This may be made also from mutton (the leg), veal, or chicken; in which case it will be a fine clear jelly, and may be eaten cold with salt and a little toast.

Beef Tea.—Take one pound of lean fresh beef, cut it into *very* small pieces, and put it into a clean saucepan with one pint and a half of cold spring water. Boil it once up; then throw in half a saltspoon of salt, skim it well, and let it simmer quietly for two or three hours. At the end of this time, if the tea seem strong enough, strain it through a bit of muslin into a basin, and then set it in a window or cellar to cool. When wanted, take off every particle of fat, if there is any, and warm up just as much as the sick person is likely to take. This tea should, if possible, be made the day before it is wanted; and when warmed up, it is best to put the quantity required into a cup and heat it on a stove or oven, rather than to put it again into a saucepan.

For making *very* strong broth or tea, the proportions are one pound of lean meat to one pint of water.

Chicken Panada.—Clean and cut up a chicken, and boil it slowly, bones and all, in a quart of water till nearly done. Then take of the skin: cut off the white meat, remove the fat if there is any, and pound it to a smooth paste with some of the water it was boiled in. When quite smooth, flavor

it with a little salt, and the least bit of grated nutmeg and fresh lemon peel—after which, boil it again gently for a few minutes, making it the consistency you like by adding more or less of the water it was boiled in. It should be stirred all the time, and is best when made about the thickness of cream or gruel.

Fever Drink.—Put a large dessertspoonful of black currant jelly or preserved tamarinds into a tumbler, and fill it up with boiling water. When cold, it is fit to drink. If too sweet, add a large quantity of water.

A Good Mild Tonic.—One ounce of gentian, half an ounce of dried orange peel, a quarter of an ounce of the lesser cardamon seeds, and one pennyworth of cochineal and saffron. Infuse these ingredients in a pint of good pale French brandy for a fortnight. Then strain it off.

From a teaspoonful to half a wineglassful of the above may be taken every morning in water.

Barley Wine.—To one pint of *boiled* barley water, nicely flavored, put half a pint of sherry. Boil it down till reduced one half. A wineglassful of this taken three or four times a day is both strengthening and nourishing to delicate people, or after an illness.

Common Gruel.—Take one dessertspoonful of Robinson's patent groats, and mix it very smooth in a basin, in about a tablespoonful of cold water. Then add to it, stirring all the time, half a pint of boiling water. Pour this into a clean saucepan, and boil it for seven or eight minutes, or till it thickens, still stirring it all the time. Put it into a breakfast cup, sweeten with a little loaf sugar, and flavor with a little wine or brandy, and a few drops of lemon juice.

Egg Broth.—Beat an egg up high in a broth basin. When quite frothy, stir into it half a pint of good, unflavored mutton or veal broth, quite hot; add a little salt, and serve with toast.

Toast and Water.—Take a slice of stale bread, cut rather thick; toast it thoroughly on both sides till it is quite hard and brown, but don't blacken it. Then put it into a jug, pour boiling water over it, and let it stand till cold.

Port Wine Jelly.—Put into a pint of Tent or Port wine two ounces of isinglass, two ounces of white sugar candy, half an ounce of gum Arabic, and one nutmeg, grated. Let these ingredients stand in covered jar, for twelve hours, and then put the jar into a saucepan of water, which keep boiling till all is dissolved. Strain through a muslin, and let it stand till cold. A piece the size of a walnut may be taken three or four times a day.

If made with *port* wine, *six* ounces of sugar candy should be added instead of *two*.

The Invalid's Jelly.—Boil one calf's foot in two pints and a half of water, till it is reduced to one pint and a half. Strain it through a sieve, and when cold take off the fat, add to it a quarter of a pint of milk or wine, the rind of a lemon, thinly pared, a little nutmeg or cinnamon, and sugar to the taste. Boil all this together for about five minutes, and then strain it through a sieve.

Appendix to Household.

The following pages of the "Household Department," are designed to assist the wives of working men especially, and also to be a medium whereby young girls can be instructed in *Simple Modes of Economical Cookery*—a want which there is every reason to believe is greatly felt. At the same time, it is hoped that it will be found useful in any household.

Utensils Absolutely Required in a Kitchen.—1 iron pot, 1 fish-kettle, 2 large iron saucepans—one with a steamer, 1 stewpan, 2 small saucepans for vegetables, 2 butter saucepans, 1 small saucepan lined with china, for boiling milk, 1 gridiron, 1 frying-pan, 1 roasting jack and stand, 1 bunch of skewers, 1 basting ladle and slice, 1 toasting fork.

For a Poor Man's Cottage.—1 iron pot, 3 saucepans, 1 gridiron, 1 frying-pan, poor man's jack for toasting.

Soups.—*Of what they are made, and how they are made.*— The water in which fresh meat has been boiled, the liquor left after boiling a calf's head, bones (especially fish bones), trimmings of meat, or ox cheek, will all make stock for soup. Keep a large saucepan or stock-pot by the side of the fire, and put into it all or any of the above materials, and let them stew and stew till they become a jelly. Then you have stock which you can make into soup; or, if you have no stock-pot, you can make soup of fresh meat. Shin of beef makes brown stock; veal makes white stock for white soups. Old fowls too tough to eat make good soup; a ham bone is a great addition to stock. If you make soup of fresh meat, put it in the stock-pot with very *little water* (and that cold) at first, and a piece of butter to keep it from burning; let it stew, *very, very* slowly, and add cold water to it by degrees. Take care that your soup-pot is clean; wash it the moment you have done using it, with hot water and a piece of soda the size of a nutmeg. Skim often, but do not *leave* the lid off; pour in now and then a cupful of cold water to make the scum rise.

Always stir the soup with a wooden spoon. Do not put in the vegetables till all the scum is off.

If you make soup of cooked meat, make it with hot, *but not boiling*, water; cut the meat for soup into small pieces.

A stock-pot does not do for a small family, as the stock does not keep unless you make soup every day.

The poor man's wife can make good and nourishing soup from cuttings or *bits* of meat bought at the butcher's.

She must add the water by degrees on the average of one quart of water to one pound of meat.

How To Roast.—Meat is dressed in six ways; that is, by roasting, boiling, stewing, broiling, frying, and baking. We will talk of roasting first.

To roast well, you *must* have a *good* fire; and must make it up so that it will last all the time the joint is doing; or, if the fire chances to require replenishing, slip in the coals with the tongs, but do not remove and chill the roast, or diminish the heat in the midst of the cooking.

If it is preferred *not* very well dressed, place it near the fire on putting down, and *brown* the *outside* quickly, which will shut in the juices; then draw it back a little, so that it will not burn; but from the very first baste it, as basting makes good roasting. If you like meat well dressed, place the joint farther from the fire at first (about 14 inches off), and move it nearer by degrees, but always basting it well. This is a more expensive way of dressing the joint, as it takes a large fire, longer kept up. Keep the meat-screen always round the roast, to protect it from a chill. If you do not possess a meat-screen make one by putting the clothes-horse round the fire and covering it with a cloth; but the heat must be shut in or it is wasted

Joints of veal or lamb have a piece of paper tied over the fat with twine, or secured with *very* small skewers before they are put to roast. Just before they are done, the paper is taken off and the joints are dredged with flour and basted; a very little salt is also sprinkled on the joints just as they are done, to draw out the gravy. Even for beef and mutton, a sprinkle of flour, basted over is an improvement; it froths them up and makes them savory.

The time for roasting is a quarter of an hour for every pound of meat; for example, if a leg of mutton weighs 8 lbs. allow 8 quarters of an hour to it, that is, 2 hours, and so on. But in frosty weather meat takes longer; it should then be set before the fire for a little while to thaw before it is put down, or it will *never* be well done. Lamb and veal require 20 minutes to the pound at 12 inches from the fire.

Boiling and Stewing.—*Boiling.*—Joints to be boiled may be put into hot or cold water. If liked *under-dressed*, plunge them into boiling water, which shuts in the juices; but the general way is to put the meat into cold water, and let it *slowly* come to a boil. The under-dressed way makes the meat more nutritious, and it goes farther; the cold-water way makes *pot liquor*, because the juices of the meat boil out. This pot liquor will make, with a little addition, good soup. We think the cold-water way best. But, then, it must be boiled gently, and not fast, and never let stop simmering. Just before the pot boils the scum will rise to the top of the water: it must be skimmed off, or it will fall back on the meat and make it look very unpalatable. The cook must keep on lifting the lid every now and then, and skimming the scum off; but the lid must be kept on all the time she is *not* skimming the pot. The fire for boiling must not be a *great fire*, as for roasting, but a moderate and gentle one. Salt meat takes longer boiling than fresh meat; 20 minutes to a quarter of an hour a lb. is required for boiling it. The time of boiling is ¼ of an hour per lb. from the time it actually boils.

Stewing is very slow simmering at the side of the fire. Frying is done by putting meat into boiling fat in a frying-pan, and turning it from side to side till it is done. Broiling is done on a greased gridiron over a clear fire.

Browning for Soups.—3 large spoonfuls of brown sugar, ½ pint of boiling water. Put the sugar into a frying-pan, set it on the fire to brown, stirring it with a wooden spoon, that it may not burn. When sufficiently dark-colored, stir into it the boiling water: when thoroughly mixed put it into a bottle, and when cold, cork it closely down, and use a tablespoonful or more, as may be required, to give a color to your soup. A burnt onion or two can be made of use for the purpose of browning, and is often considered better than the above receipt.

Beef Soup.—Time, 9 hours.—5 lb. of shin of beef, a quart of water to each lb. of meat, 1 head of celery, 1 onion, 4 small or 3 large carrots, 2 turnips, a bunch of sweet herbs, pepper and salt.—Cut off the meat from the bone, and put the bone into a stewpan with the water, and let it boil slowly for 4 hours; then strain it into a large basin, and when cold remove the cake of fat; cut the meat into small pieces, and put them into a stewpan with the strained gravy, the herbs tied together, the celery, onion, carrots, and turnips cut small; let them simmer slowly for 5 hours, seasoning with pepper and salt to your taste, and adding a spoonful of browning. When done, take out the herbs and it will be ready for use.

Cottage Soup.—Time, to simmer 4 hours.—2 oz. of dripping, ¼ lb. of any solid fresh meat in dice an inch square, ¼ lb. of onions, ¼ lb. turnips, 2 lbs. of leeks, 3 oz. of celery, ¼ lb. of rice, 3 oz. of salt, ¼ oz. of brown sugar, 6 quarts of water.—Put the meat, sugar, dripping, and onions into an iron saucepan; stir them till lightly browned; add turnips, celery, and leeks; stir 10 minutes. Mix well with it a quart of cold water and rice; add 5 quarts of hot water and salt to your taste; stir occasionally till it boils. If to be kept, stir gently till the soup is nearly cold.

Cottage Soup, *baked.*—Time, 3 or 4 hours. 1 lb. meat, 2 onions, 2 carrots, 1 pint white peas, pepper and salt, 1 gallon of water. Cut the meat into slices. put one or two at the bottom of an earthen jar or pan, lay on it

the onions sliced; then lay in slices of meat again, then the carrots sliced; soak the peas all the previous night; put them in with the water. Tie the jar down, and put it in a hot oven for 3 or 4 hours.

Chicken Broth.—Time, 1 hour. 1 full-grown chicken, or an old fowl, 3 pints of water, or weak broth, ½ a teacupful of pearl barley or rice, pepper and salt.—Cut up a chicken, or an old fowl, put to it the cold water or broth, and half a teacupful of pearl barley (or rice, if preferred); cover it close, and let it simmer for an hour; skim it clear, and add pepper and salt to your taste. The chicken may be placed on a dish with pieces of butter over it, a dust of pepper, and served with mashed potatoes.

Poor Man's Soup.—Time 1 hour and 10 minutes.—2 quarts of water, 4 spoonfuls of beef dripping, 1½ oz. of butter, 1 pint basinful of raw potatoes, 1 young cabbage, and a little salt.—Put the water into a stewpan, and when boiling throw in the beef dripping and the butter, a pint basinful of raw potatoes sliced, and let them boil 1 hour. Pick a young cabbage, leaf by leaf, or the heart of a white cabbage, but do not chop it small; throw it in, and let it boil 10 minutes, or till the cabbage be done to taste, though when boiled fast and green it eats much better. Season it with a little salt, and throw it over thin slices of bread in a tureen.

Good and Cheap Soup.—Time, 4 hours.—4 lb. of lean beef or mutton, 5 quarts of water, 6 carrots, 6 turnips, 3 small onions, 2 heads of celery, and 1 spoonful of black pepper.—Cut in slices the beef or mutton, and fry them brown in a little butter,then put them into a stewpan, with their gravy; cut the carrots and turnips in slices, 3 small onions, and 2 heads of celery, with their green tops, add the black whole pepper, and about 5 quarts of water. Let it boil, and simmer slowly till the meat is reduced to a pulp; then strain it through a fine sieve, and serve with or without vegetables.

French Soup.—Time, 3 hours.—3 quarts of water, 4 lbs. of meat, 2 teaspoonfuls of salt, 3 small carrots, 3 middling-sized onions (one being stuck with 2 cloves), 1 head of celery, 1 bunch of thyme, 1 bay leaf, and a little parsley tied together, 2 turnips, 1 burnt onion, or a little browning.—Put the meat into a stock-pot with the water, set it over a slow fire, and let it gently boil, carefully taking off the scum that will rise to the top. Pour in a teacupful of cold water, to help the scum to rise. When no more scum rises, it is time to put in the vegetables, which you should have, ready washed and prepared. Cut the carrots in slices, stick the onions with cloves, cut the turnips each in four pieces. Put them into the pot and let them boil gently for two hours. If the water boils away too much, add a little *hot* water in addition; a few bones improve the soup very much. It is not necessary to keep the pot very closely covered.

Scotch Mutton Broth.—Time, 3½ hours.—6 lb. of neck of mutton, 3 quarts of water, 5 carrots, 5 turnips, 2 onions, 4 tablespoonfuls of Scotch barley, and a little salt.—Soak the mutton in water for an hour, cut off the scrag, and put it in a stewpan, with 3 quarts of water as soon as it boils; skim it well, and then simmer it for an hour and a half. Cut the best end of the mutton into cutlets, dividing it with 2 bones in each; take off nearly all the fat before you put it into the broth, skim it the moment the meat boils, and every 10 minutes afterwards; add the carrot, turnips, and onions, all cut into two or three pieces, then put them into the soup soon enough to be thoroughly done; stir in the Scotch barley after you have well washed it in cold water; add salt to your taste, and let all stew together for 3½ hours; about half an hour before sending it to table, put in a little chopped parsley, and serve all together.

Wrexham Soup (*a very Cheap Soup.*—Time, 6 or 7 hours.—1 lb. of lean beef, and every description of vegetable in season; no water.—Cut 1 lb. of gravy beef into very small pieces, put them into a ½ gallon jar, fill it up with every description of vegetables, even lettuces. Tie the jar over with a bladder, and put it over the fire in a deep saucepan of boiling water, or in the oven, which is far better, for at least 6 hours. This generally makes sufficient soup for 4 persons: a little pepper and salt must be added.

White Soup.—Time, 4 hours.—3 lb. of veal, 1 teacupful of Scotch barley, 3 quarts of water, pepper and salt to taste. Put into a stewpan 3 lbs. of veal, one teacupful of well-washed Scotch barley, 3 quarts of water; boil together for 4 hours; then strain the soup through a hair-sieve. It ought to be seasoned, like other soups, to your taste, and should have the appearance of a thin smooth cream.

Pea Soup without Meat.—Time, 3 hours.—1 pint of split peas, 3 quarts of spring water, 2 large onions, outside sticks of 2 heads of celery, a little dried mint, 1 handful of spinach, 2 carrots, 2 turnips; a few bones, or tiny pieces of bacon, flavor it nicely; pepper and salt to give taste.—Boil all these vegetables together till they are soft and tender, strain them through a hair sieve, pressing the pulp through it. Then boil the soup well for an hour with the best part of the celery, and a teaspoonful of pepper; add a little fried mint, with a little spinach; a few roast beef-bones, or a slice of bacon, will be an improvement.

Carrot Soup.—Time, 4½ hours.—13 oz. of scraped carrot to 1 quart stock. Boil as many red carrots in water as you require until tender; then cut up the red part, and pound it very fine; weigh it, and to every 12 or 13 oz. of pounded carrot, add a quart of gravy soup or good stock, mixed gradually with it; season with a little salt and cayenne; strain it through a sieve, and serve it very hot with fried bread cut into dice in a separate dish.

Brown Onion Soup.—Time, 3 hours.—6 large Spanish onions, 5 quarts of water, a little pepper and salt, 1 penny roll, yolks of 2 eggs, 2 spoonfuls of vinegar.—Skin and cut the onions in thin rings, fry them in a little butter till they are a nice brown color, and very tender; then lay them on a hair sieve to drain from the butter; put them into a stewpan with 5 quarts of water: boil them for 1 hour, and stir them often; then add pepper and salt to your taste. Put the crumb of a penny roll through a colander, put it to the soup, stirring it well to keep it smooth as you do so. Boil it 2 hours more. 10 minutes before you serve it beat the yolks of the eggs with the vinegar, and a little of the soup; pour it in by degrees, and keep stirring it all the time one way. It will then be ready to serve: this soup will keep three or four days.

Conger Eel Soup.—Time, 2¾ hours, or more.—The head and tail of a conger eel, 3 quarts of water, ¼ lb. of butter, 1 leek, the blossoms of 4 or 5 marigolds, and a few leaves, ½ pint of green-peas, or the white heart of a cabbage, half a teacup of parsley, a bunch of thyme, 2 tablespoonfuls of flour, a pint of milk, and a little salt.—Put the head and tail of a conger eel in a stewpan with 3 quarts of water, and let it simmer 2 hours and a half, or rather more till it breaks to pieces when tried with a fork. Strain through a sieve, and pour back the liquor into a stewpan with a ¼ lb. of butter; when boiling throw in a small leek, a few marigold leaves cut up, ½ pint of green-peas (or asparagus cut up small when green-peas cannot be procured)—or, what is by many preferred, the white heart of a cabbage cut up—about a pint basinful, or rather more, half a teacupful of parsley chopped small, and a bunch of thyme. Mix 2 heaped tablespoonfuls of flour in a pint of milk, the blossoms of four or five marigolds plucked, and when the peas or asparagus are done, throw it into the stewpan, stirring it all the time till it comes to a boil; then let it simmer 10 minutes to take off the rawness of the flour, with the lid off the stewpan, or it would boil over. Some who prefer the parsley green do not put it in till after the milk boils. Before dishing up, season with a little salt, as the salt is apt to curdle the milk if added before; have ready thin slices of bread in your tureen, and pour the soup over it.

Family Soup.—Time, 6 hours.—3 or 4 quarts of pot liquor, *i. e.* the water in which mutton or salt-beef has been boiled. Any bones from dressed meat, trimmings of poultry, scraps of meat or 1 lb. of gravy beef, 2 large onions, 1 turnip, 2 carrots, a little celery seed tied in a piece of muslin, a bunch of savory herbs, 1 sprig of parsley, 5 cloves, 2 blades of mace, a few peppercorns; pepper and salt to taste.—Put all your meat-trimmings, meat-bones, &c., into a stewpan; stick the onions with cloves, and add them with

the other vegetables to the meat; pour over all the pot-liquor; set it over a slow fire and let it simmer gently, removing all the scum as it rises. Strain through a fine hair sieve. This is a good foundation for any soups.

Fish.—*Directions for Cooking.*—Clean your fish carefully, slit it low enough so as not to have any blood on the backbone, but do not make too large a cut to spoil the look of the fish. The sound adheres to the bone, and must be left; so must the hard and soft roes; care must be taken not break the liver, which in most fish is replaced; *great care* must be taken not to break the gall, for it would make the fish bitter. Never fry fish in butter, fry them in good dripping or lard: oil is the best, but it is very expensive.

Boiled Salmon.—Time, according to weight; 10 minutes to the lb. Salmon, 4 oz of salt to 1 gallon of water.—Scale, empty, and wash the salmon with great care, removing the blood from the inside; boil the salt rapidly in the fish-kettle for a minute or two, taking off the scum as it rises; put in the salmon and let it boil gently till it is thoroughly done; take it from the water, drain it, put it on a wet folded napkin, and garnish with slices of lemon. Sauce, shrimp, or lobster; send up dressed cucumber with salmon, if you have one.

Brill and Turbot Alike.—Time, 10 to 20 minutes.—One brill, ¼ lb. of salt to each gallon of water, 1 tablespoonful of vinegar, 1 lemon.—Clean and remove the scales from the fish, do not cut off the fins, but rub it over with a little lemon-juice and salt; set it in a fish-kettle with sufficient cold water to cover it; a handful of salt, and a tablespoonful of vinegar; gradually boil, and then simmer for 10 or 20 minutes, according to the size of the fish; skim it well, as care is required to preserve the color. Serve it on a napkin, and garnish with lemon, curled parsley, or horse-radish; send it to table with lobster sauce in a tureen. All fish are boiled alike; salmon takes 10 minutes to the pound to boil; soles, &c., about 8 or 10 minutes.

Salt Fish.—Time, 1 hour.—Put the salt cod in water the night before it is wanted, and let it soak all night; boil it, lay it on a dish, pour egg sauce over it, and send it up hot; the egg sauce may be sent up separately, and boiled parsnips placed round the dish. If the cod be very dry, soak it for several hours, lay it out to dry in a cold place, and then soak it again for a number of hours. This double soaking will soften the driest fish.

Salt Fish the Second Day.—Time, 20 minutes.—The remains of salt fish previously dressed, same quantity of mashed potatoes and parsnips; ¼ lb. of butter; 1 or 2 eggs.—Pick the fish into small flakes, butter the bottom of a pie-dish, place it in alternate layers, with the mashed potatoes and parsnips. Bake it, turn it out on a dish, and pour over it some egg sauce.

Cod's-Head and Shoulders.—Time, ½ an hour or more.—Cod's-head and shoulders; 4 oz. of salt to each gallon of water, 3 spoonfuls of vinegar.—Rub a little salt down the bone, and the thick part of the fish, and tie a fold or two of wide tape round it to prevent its breaking. Lay it in a fish-kettle with sufficient salt and water to cover it, add 3 spoonfuls of vinegar. Let the water be brought just to the point of boiling, then draw the fish-kettle to the side of the fire to simmer gently till the fish is done, which can be ascertained by trying it with a fish-slice to see if the meat can be separated easily from the bone. Skim it carefully; when done, drain it and shift it off the fish-strainer on a folded napkin in a dish. Garnish with parsley, lemon, and the roe and liver of the cod.

Fried Soles.—Time, 8 or 10 minutes.—2 soles, 1 egg, a few bread-crumbs.—Remove the skin from the dark side of the soles, clean them, and wipe them dry; dredge a little flour over them; brush them over with the yolk of a beaten egg; dip them into bread crumbs, and fry them of a light brown, in sufficient *boiling* fat for them to cover them; when done, lay them on a cloth to absorb the grease, dish them on a napkin folded, and garnish with fried parsley. Plain melted butter or shrimp sauce may be sent to table with them.

Fried Whiting.—Time to fry, 10 minutes.—Egg, bread-crumbs, and a

little flour.—Clean the whitings, take off the skin, and fasten the tail into the mouth, dry them in flour. Brush them over with the yolk of an egg well beaten, dip them in bread-crumbs, fry them in hot lard, and serve them on a napkin, garnished with fried parsley. These receipts will show how to fry all fish for company.

Boiled Soles.—Time, 8 to 10 minutes.—1 or 2 soles; a large handful of salt in 1 gallon of water.—Wash and clean the soles, cut off the fins, and put them into a fish-kettle with salt and water. Let them boil slowly, and then simmer until done, a large one requiring 10 minutes, a medium-size one, 8: when done, serve on a napkin with the white side up. Garnish with slices of lemon, and parsley.

To Boil Whiting.—Time 10 minutes for large fish.—4 or 6 whitings; 3 oz. of salt to each gallon of water.—Cleanse the fish and lay them in the fish-kettle with sufficient water to cover them; bring them slowly to a boil, and simmer for 5 or 6 minutes, or for a longer time should the fish be large. Dish them on a folded napkin, and garnish with bunches of double parsley.

Baked Hake.—Time, varying in size.—In season from May to August. —Be careful in cleaning your hake; then stuff it with veal stuffing, sew it up with packthread; egg and bread-crumb it over, set it in a baking-dish and put it into a hot oven. Let it bake till the fish parts easily from the bones; it is impossible to fix a time for cooking it, unless the size of the fish were stated.

Sprats.—Time, 2 or 3 minutes.—Well-clean a number of sprats, fasten them in rows by a skewer run through their gills, place them on a close-barred gridiron, broil them a nice brown and serve them hot.

Boiled Eels.—Time, ½ an hour.—Some small eels and a little parsley and butter.—The small eels are the best to boil; put them in sufficient water to cover them; add a bunch of parsley: when tender they are done. Serve them up in a shallow tureen, with parsley and butter sauce poured over them.

Fried Eels.—Time, 18 or 20 minutes.—1 large eel or 2 small ones, 1 egg and a few bread-crumbs.—Prepare and wash the eels, wipe them thoroughly dry, and dredge over them a very little flour; cut them into pieces of about 3 inches long, brush them once with egg, dip them into bread-crumbs, and fry them in hot fat. If very small they should be curled round and fried, being first dipped into egg and bread-crumbs; serve them up garnished with fried parsley.

Scalloped Oysters.—Oysters, bread-crumbs, 2 oz. of butter, pepper and salt.—Open the oysters, and if any pieces of shell hang about them take them off with a knife, or rinse them in their own liquor, but do not dip them in water. Leave each oyster in its own deep shell; sprinkle over it a little pepper and salt, and some crumbs of bread, and lay little pieces of butter at the top; arrange the shells on a dish and put it in the oven, or in a Dutch oven before the fire. When the oysters are thoroughly hot, they are done.

To Bake Herrings.—Herrings, a little pepper and salt, two bay leaves, and some vinegar.—Clean and wash your herrings, lay them on a board and rub them with pepper and salt; curl them round and fasten each with a small skewer, or bit of wood; lay them in a dish, cover them with vinegar; add two or three bay leaves; tie them over with a thick paper, put them into a moderate oven, and bake them for an hour. To be eaten cold; serve on a dish with a sprig of double parsley in the centre of each dish, and the vinegar poured round them.

To Fry Herrings.—Time, 10 or 12 minutes.—1 egg and a few bread-crumbs.—Egg and bread-crumb your fish (when it is quite cleaned), and fry over a clear fire, or, better still, broil these fish.

Filleted Plaice.—1 egg and bread-crumbs.—Cut the fish off the bones and divide it into pieces. Egg and bread them, and fry over a clear fire.

Sauces.—Melted butter.—2 oz. of butter, a little flour, 2 large spoonfuls

of water.—Put the butter into a clean saucepan with the water; dredge in a little flour, and shake it over a clear fire, *one way*, until it boils; then pour it into your tureen, and serve.

Common Egg Sauce.—Time, 20 minutes.—2 eggs, ¼ of a pint of melted butter.—Boil the eggs for 20 minutes: when cold shell them, cut them into very small dice; put the minced egg into a very hot sauce tureen, and pour over them a ¼ of a pint of boiling melted butter. Stir the sauce round to mix the eggs with it.

Fennel Sauce.—Time, 10 minutes.—½ pint of melted butter, a small bunch of fennel leaves, a little salt. Strip the leaves of the fennel from their stems, wash them carefully, and boil them quickly (with a little salt in the water) till tender; squeeze them till the water is pressed from them, mince them fine, and mix them with hot melted butter.

Parsley Sauce.—Time, 6 or 7 minutes.—½ pint of melted butter, a small handful of parsley.—Wash the parsley, boil it for six or seven minutes till tender; then press the water out of it, chop it fine, make ½ or ¼ of a pint of melted butter, as required; mix the parsley gradually with the hot melted butter.

Lobster Sauce.—Time, 10 minutes.—1 hen lobster with coral.—Cut the lobster into small pieces; mix it with the coral, and put it into ½ pint of melted butter.

Oyster Sauce.—Time, 5 minutes.—1 dozen oysters, half a teacupful of good clear gravy, ½ pint of melted butter.—Stew the beards of the oysters in their own juice with half a teacupful of good clear gravy, strain it off; add to it the melted butter, which should be ready; put in the oysters, and let them simmer gently for 3 minutes.

Apple Sauce.—Time, 20 minutes.—8 apples, a small piece of butter, and sugar.—Pare, core, and cut the apples into slices; put them into a saucepan with sufficient water to moisten and prevent them from burning; boil them until sufficiently tender to pulp; then beat them up smoothly with a piece of butter, and sweeten to your taste.

Common Onion Sauce.—Time, nearly ½ an hour.—4 or 5 white onions, ½ pint of hot milk, 1 oz. of butter; pepper and salt to your taste.—Peel the onions and boil them till they are tender; dress the water from them, and chop them very fine; make the milk hot; pulp the onions with it. Add the butter, and pepper and salt to your taste.

Beef.—To roast a sirloin of beef.—Time, ¼ of an hour to each 1 lb. of meat.—Make up a good fire; spit or hang the joint evenly at a short distance from it; put a little clarified dripping in the dripping pan, and baste the joint well as soon as it is put down to dress; baste again every ¼ of an hour till about 20 minutes before it is done; then stir the fire and make it clear; sprinkle a little salt, and dredge a little flour over the meat; turn it again till it is brown and frothed. Take it from the spit, put it on a hot dish, and pour over it some good made gravy, or mix the gravy left at the bottom of the dripping-pan with a little hot water, and pour over it; garnish with fine scrapings of horse-radish in little heaps. Serve Yorkshire pudding with it on a separate dish.

Roast Ribs of Beef.—Time, ¼ of an hour to every 1 lb.—The chine bone and the upper part of the rib bones should be taken off, and the flap ends fastened with very small skewers. The joint is roasted and served as the sirloin.

Ribs of Beef, Rolled.—Time, 15 minutes to each 1 lb., or 15 minutes and ½ hour over if very large.—Order the butcher to take out the bones from the joint; roll it into a round, and fasten it with skewers and a broad piece of tape; place it before a large fire; put some beef dripping in the pan; baste it the moment the dripping melts, and do the same every ¼ of an hour. Just before it is done, *i. e.*, about 20 minutes before you remove it from the fire, dredge it lightly with flour, and baste it with a little butter. Remove the tape and skewers and fasten it with a silver skewer instead, if your mistress happens to have one. Serve with good gravy over it; it is an improvement to fill the centre with stuffing.

Silver Side of Beef, Boiled.—Time, 20 minutes to each lb.—10 or 12 lb. of the silver side of beef, 3 gallons of water.—After the beef has been in the pickle for about 9 or 10 days, take it out and wash it in water, skewer it up in a round form, and bind it with a piece of tape. Put it into a large stewpan of water; and when it boils remove the scum very carefully, or it will sink, and spoil the appearance of the meat; then draw the saucepan to one side of the fire, and let it simmer slowly till done. When ready to serve, draw out the skewers, and replace them with a bright one; pour over it a little of the liquor in which it has been boiled, and garnish with boiled carrots and parsnips.

When taken from the water, trim off any soiled parts from the beef before sending it to table.

A Beef Stew.—Time, 2 hours and 20 minutes.—2 or 3 lb. of the rump of beef, 1 quart of broth or gravy, pepper and salt, the peel of 1 large lemon and the juice, 2 large spoonfuls of ketchup, 1 of flour.—Cut away all the skin and fat from the beef, and divide it into pieces about 3 or 4 inches square; put it into a stewpan, and pour the broth in on it; then let it boil, and sprinkle in pepper and salt to your taste: when it has simmered 2 hours spread finely the peel of a large lemon, and add it to the gravy. In 20 minutes pour in a flavoring of Harvey's sauce, the juice of the lemon, the flour and a little ketchup.

Ox Cheek, Stewed.—Time, 7 hours altogether.—½ an ox head, a bunch of sweet herbs, 1 head of celery, 1 small onion, 4 cloves, pepper and salt, 3½ pints of water.—Well wash the ox head, and let it soak in cold water for several hours; then put it into a stewpan, with a bunch of herbs, 1 onion, the celery cut into slices, 4 cloves, and pepper and salt. Pour in about 3½ pints of water, or rather more, and set it over a gentle fire to simmer slowly. When tender take out the head, and cut the meat from it in rather small pieces, strain the gravy, and put about the third part of it into a stewpan with the pieces of head. Make all very hot and serve it up quickly.

To Dress a Bullock's Heart (English Fashion).—Time, 2 hours.—1 heart, veal stuffing, ½ pint of gravy.—Soak a bullock's heart for 3 hours in warm water, remove the lobes, and stuff the inside with veal forcemeat; sew it securely in; fasten some white paper over the heart, and roast it for 2 hours before a strong fire, keeping it basted *frequently*. Just before serving remove the paper, baste, and froth it up, and serve with gravy poured round it, and serve red-currant jelly separately.

Boiled Marrow Bones.—*Served on a Napkin or Toast.*—Saw the bones any size you may prefer. Cover the ends with a common paste of flour and water; tie a cloth over them, and place them in a small stewpan, with sufficient boiling water to cover. When sufficiently boiled, serve them upright on a napkin; or, when boiled take out the marrow and spread it on toasted bread; cut into small square slices, season it with a little pepper and salt, and send it to table very hot.

Ox Tongue.—Time, 1 hour to warm; 2½ hours, if large, to simmer.—Choose a plump tongue with a smooth skin, which denotes the youth of the animal. If it has been salted and dried, soak it before you boil for 20 hours in plenty of water. If it is a green one fresh from the pickle, soak it only 3 or 4 hours. Put it into cold water, let it gradually *warm* for 1 hour, then let it slowly simmer for 2½ hours. Plunge it into cold water in order to remove the furred skin; bend it into a nice shape with a strong fork; then trim if it is to be served as a cold tongue, and ornament the root with a frill of cut paper. If it is to be served hot, it must be wrapped in greased paper and warmed again in hot water, after removing the coating; if to be served cold, let it stand in the water in which it is boiled until cold.

Broiled Steak.—Time, 8 to 10 minutes.—Rump steak, 1 oz. of butter, pepper and salt.—Rump steak is best for broiling and frying; beefsteak for stewing. Have the steak cut about ¼ or ½ an inch in thickness; place the gridiron over a clear fire, and rub the bars with fat. Place the steak on

it and broil it, turning it frequently, and *carefully* pricking the fork through the fat, for if the steak itself is pricked the gravy will run out, and it will harden. Have ready a hot dish on which you have placed a lump of butter the size of a large walnut, the ketchup, and pepper and salt. Lay the steak (rubbing it lightly over with butter) on the dish, and serve as quickly as possible.

Rump Steak and Fried Onions—Time, 20 minutes.—A rump steak, 3 onions, a good sized piece of butter, and a little salt Fry a rump steak a nice brown, and put it into a hot dish with a good-sized piece of butter on the top, or pour the fat from the pan, put in a little water, and shake it about, let it just boil, and pour it over the steak. Have ready the onions, cut into thin rings, and again divided across; fry them lightly, and when done drain them on a cullender before the fire, stirring in a little salt. Serve them on a separate dish, as the flavor of onions is often disliked.

Steak Stewed in a Plain Way.—Time, 40 minutes altogether.—½ pint of water, 1 onion, 1 spoonful of walnut ketchup, a piece of butter rolled in flour and some pepper and salt.—Fry the steaks in butter a good brown, then put them in a stewpan with ½ a pint of water, the onions sliced, the ketchup, some pepper and salt; cover the pan close, and let them stew slowly. Thicken the gravy with a piece of butter rolled in flour, and serve them on a hot dish.

Fillets of Beef.—Undercut of sirloin of beef, 1 lemon, ¼ pint of good gravy, mashed potatoes for centre.—Cut the undercut of the beef into small slices; broil them a delicate brown; warm the gravy over the fire. Have ready a mould of mashed potatoes in the centre of a very hot dish; lean the tiny cutlets when done against the side of the potatoes; pour around them the gravy, having first squeezed a lemon into it. Serve hot.

Bubble and Squeak.—Time, 20 minutes.—Slices of cold boiled beef, chopped potatoes, chopped-up cabbage, both previously boiled; pepper, salt, and a little butter.—Chop up and fry the cold potatoes and cabbage with a little pepper, salt, and a good large piece of butter; set it aside to keep hot. Lightly fry some slices of cold boiled beef; put them in a hot dish, with alternative layers of vegetable, piling it high in the middle.

Stewed Beef Kidney—Time, 30 minutes.—A beef kidney; pepper and salt.—Cut the kidney into slices, season it highly with pepper and salt, and fry it of a light brown; then pour a little warm water into the pan, dredge in some flour, put in the slices of kidneys, and let them stew very gently. Sheep's kidneys should be split open, broiled over a clear fire, and served with a piece of butter placed on each half.

Minced Beef.—Time, 10 minutes.—1½ lb. of beef, 6 oz. of bacon, 2 small onions, a little pepper, 2 nutmegs, 1½ oz. of butter rolled in flour, a spoonful of browning.—Mince about 1½ lb. of beef with the bacon, and onions, seasoning it highly with pepper and nutmeg. Take a sufficient quantity of stock made from bones, and any trimmings, a piece of butter rolled in flour, and a little browning; make it hot, and strain it over the mince; put the whole into a stewpan, let it simmer for a few minutes, and serve it on a hot dish, with sippets of toasted bread arranged round the edge of the dish, and poached eggs on it (or a hard boiled egg divided and placed on each sippet).—It is surrounded by a wall of mashed potatoes.

Hashed Beef—Plain.—Time, 25 minutes.—Some slices of cold roast beef, 2 onions, 1 spoonful of mushroom ketchup, and the gravy from the meat or from the bones boiled down, pepper and salt. Put the gravy saved from roast meat (with a little water if not sufficient), or the bones of the cold joint, boiled down to a gravy, into a stewpan with the onions, mushroom ketchup, some pepper, salt, and a little butter rolled in flour to thicken it; let it simmer gently for a quarter of an hour, take it from the fire, and when cold remove the fat. Cut the meat into slices, dredge them with flour, and lay them in the stewpan with the gravy; let it simmer slowly for 10 minutes until hot, taking care it does not boil, or the meat will be hard. Garnish it with sippets of toasted bread.

TRIPE.—Time, 2 hours.—2 lb. of tripe, equal parts of milk and water, 4 large onions.—Take 2 lb. of fresh tripe, cleaned and dressed by the tripe-dresser, and simmer it for two hours in water; the onions should be put on the fire at least ½ an hour before the tripe is put into the stewpan, and thus made into onion sauce, to be served with the tripe. Tripe may also be cleaned, dried, cut into pieces, fried in butter, and served with melted butter, but it is very rarely tender.

LEG OF MUTTON ROASTED.—Time, ¼ of an hour or 20 minutes to each 1 lb.—A leg of mutton intended for roasting can be kept much longer than for boiling, but it must be wiped very dry, and dusted with flour and pepper. Cut off the knuckle, remove the thick skin, and trim off the piece of flank. Put a little salt and water into the dripping pan, and baste the joint for a short time with it; then use the gravy from the meat itself, basting it every 10 minutes. Serve it with gravy poured round it. The wether leg of mutton is the best for roasting. A leg of mutton, if too large, can be divided, and the knuckle boiled. By placing a paste of flour and water over the part cut off, to keep in the gravy, it can be roasted, by which means two roast dinners can be had from the one joint.

ROAST SHOULDER OF MUTTON.—Time, ¼ of an hour to each 1 lb.—A shoulder of mutton should be basted in roasting. Roast this joint at a brisk fire. It should be well hung, and served with onion sauce.

ROAST LOIN OF MUTTON.—Time ¼ of an hour to each 1 lb.—Roast this joint at a bright fire, and baste carefully about every ¼ of an hour. Brown and froth it as before directed for leg, &c.

TO ROLL A LOIN OF MUTTON.—Time, ¼ of an hour to each 1 lb.—A loin of mutton, veal stuffing, and a large spoonful of ketchup.—Hang a loin of mutton till tender, take out the bone, and lay over the meat a stuffing made as for veal; roll it up tightly, fasten it with skewers, and tie it around with a string; roast it before a brisk fire; make a gravy of the bones, adding the ketchup, and a little salt. When the meat is done pour some of the gravy made from the bones, mixed with the gravy from the meat, over it, and serve—with currant jelly, separately.

BOILED LEG OF MUTTON.—Time ¼ of an hour to 1 lb. of meat.—Cut off the shank bone, and wash and wipe the joint very clean. Then put it into a saucepan with cold water, and put it over a good fire. As the scum rises, skim it off.

BOILED NECK OF MUTTON.—Time, ¼ of an hour to every lb. Take the best end or middle of a neck of mutton, see that it is thoroughly jointed, and put it into a stew pan, with sufficient cold water to cover it. When it boils skim it carefully, and throw in a little salt; then draw the stewpan to the side, and let it simmer gently until the meat is well done; allow the time from when it begins to simmer.

MUTTON CUTLETS.—Time, to stew, 7 minutes; to broil 10 minutes.—Some chops from the loin, a sprig of thyme and parsley, yolk of one or two eggs, bread-crumbs, salt and cayenne pepper to taste, 2 oz of. butter, juice of a small lemon.—Cut some cutlets from a loin of mutton, take off an inch from the top of each bone, and from the thickest end; melt two oz. of butter in a stewpan, season the cutlets, and put them into a stewpan with a piece of butter, and a little thyme and parsley chopped fine, season with pepper and salt; fry them lightly, and then take them out to cool. Take some fresh chopped parsley and some bread-crumbs, spread them over the cutlets with a knife, wrap them in buttered papers, and broil them over a clear fire. Serve them up in the papers.

MUTTON CHOPS BROILED. Time, 10 minutes.—Cut some chops from the best end of the loin or neck, trim them neatly, removing the skin and fat, leaving only enough of the latter to make them palatable; place the chops on a gridiron over a very clear fire, turn them frequently, taking care that the fork is not put into the lean part of the chops, season them with pepper and salt. When just finished cooking, put a piece of fresh butter over each chop, and send them to table on a hot dish. Pork chops are cooked in the same manner.

Minced Mutton.—Time ½ an hour.—1½ lb. of meat, ½ pint of good brown gravy, pepper and salt.—Mince some dressed mutton as fine as possible, season it highly with pepper and salt, warm ½ a pint of good brown gravy, or gravy made from the bones, make the mince very hot, and send it to table.

Irish Stew.—Time about 2 hours.—2½ lb. of chop, 7 potatoes, 4 turnips, 4 small onions, nearly a quart of water.—Take some chops from a loin of mutton, place them in a stewpan in alternate layers of sliced potatoes and chops; add the turnips and onions cut into pieces, and pour in nearly a quart of cold water; cover the stewpan closely, and let it stew gently till the vegetables are ready to mash, and the greater part of the gravy is absorbed; then place it in a dish, and serve it up hot.

Hashed Mutton.—1 hour and 20 minutes.—Some cold mutton, 1½ pints of water, 14 peppercorns, 4 allspice, a bunch of savory herbs, a large piece of butter, a spoonful of browning, or more if liked.—Cut the cold mutton into slices, put the bones into a stewpan with the herbs, spice, and 1½ pint of water; set it over the fire, and let it simmer gently for an hour. Cut a slice or two of onion if liked, fry them a nice brown, and add them to the bones and herbs. Let all simmer together for 10 or 12 minutes; then strain it through a hair sieve, and when cold take off the fat. Put the slices of meat dredged with flour into the stewpan, add the gravy, with a spoonful of browning and two of walnut ketchup; make it very hot, but do not let it boil. Serve it with sippets of toasted bread round the dish.

Sheep's Head.—Time, 2 hours.—1 head, 2 onions, 2 carrots, 2 turnips, a piece of celery, 5 cloves, a sprig or two of thyme, 1 bay leaf, ¼ oz. of pepper, 3 quarts of water, salt to taste, Put the head into a gallon of water, and let it soak for 2 hours, wash it thoroughly, saw it in two from the top, take out the brain, cut away part of the uncovered portions of the skull and the ends of the jaws; wash it well once more. Put the onions, carrots, turnips, celery, thyme, bay leaf, and seasoning into a stewpan, with three quarts of water. Let it simmer very gently; take out the vegetables and bunch of herbs; skim off the fat; lay the head on a dish. Have the brain ready boiled (it will take 10 minutes to do), chop it up fine, warm it in parsley and butter, put under the head, and serve.

Lamb and Veal.—Lamb and veal are roasted and boiled exactly as beef and mutton are, only they require a little longer time, that is 20 minutes to the pound, and 10 minutes over.

Lamb's Fry.—Time altogether, 20 minutes.—1 lb. of lamb's fry, 1 egg, 1 oz. of bread-crumbs, a sprig of parsley, pepper and salt.—Boil some lamb's fry for about a ¼ of an hour; then drain it dry. Brush it over with the yolk of a beaten egg, and then cover it with bread-crumbs, seasoned with minced parsley, pepper and salt; fry it till it is a nice color, that is for about 5 minutns, and serve it on a folded napkin, with fried parsley.

Lamb Cutlets and Lamb Chops.—are dressed in the same way as mutton chops and mutton cutlets.

Veal Stuffing.—Mix 6 oz. of bread-crumbs with the peel of a lemon chopped very fine, a tablespoonful of chopped savory herbs, 3 oz. of finely chopped beef suet, or of butter broken into small pieces; season it and bind it with two well beaten eggs.

To Roast a Fillet of Veal.—Time, 4 hours for 12 lb.—Veal, ½ pint of melted butter, ½ lb. of forcemeat, a lemon.—Take out the bone of the joint, and make a deep incision between the fillet and the saddle. Fill it with the forcemeat of veal stuffing. Bind the veal up in a round form, and fasten it with skewers and twine; cover the veal with buttered paper, and put it at some distance from the fire at first, advancing it as it becomes dressed. Baste it well, and just before it is done take off the paper, dredge a little flour over it, and baste it with butter; remove the skewers, and replace them with a silver one; pour over the meat some melted butter, with the juice of the lemon, and a little of the brown gravy from the meat. Garnish with sliced lemon; serve with either ham, bacon, or pickled pork.

CALF'S HEAD BOILED.—Time, to soak, 1½ hours, to simmer, 1½ hours.—½ a calf's head, ½ pint of melted butter, with parsley, 1 lemon, a pinch of pepper and salt.—Soak the half calf's head in cold water for 1½ hours; then for 10 minutes in hot water before it is dressed; put it into a saucepan with plenty of cold water (enough for the head to swim), and let it boil gently; when the scum rises skim it *very* carefully; after the head boils let it simmer gently for 1½ hours. Serve it with melted butter and parsley over it, and garnish with slices of lemon and tiny heaps of fried parsley. Ham should be served with calf's head, or slices of bacon.

CALF'S BRAINS AND TONGUE.—Time to boil, 10 or 15 minutes.—A little parsley and thyme, 1 bay leaf, a little pepper and salt, 2 tablespoonfuls of melted butter, juice of ¼ of a lemon, a pinch of cayenne.—Separate the two lobes of the brain with a knife, soak them in cold water with a little salt in it for 1 hour; then pour away the cold water, and cover it with hot water, clean and skin them; boil them very gently in ½ pint of water; take off the scum as it rises. Take them up, drain and chop them, and put them to warm in a stewpan, with the herbs chopped, the butter or cream, and the seasoning; squeeze a *little* lemon juice over them, stir them well together. Boil the tongue, skin it, take off the roots, lay it in the middle of the dish, and serve the brains round it.

HASHED CALF'S HEAD.—Time, 1½ hours.—½ a calf's head, a bunch of savory herbs, 2 blades of mace, a little cayenne pepper and salt, 1 lemon, 1½ gills of sherry or white wine, 2 dessertspoonfuls of mushroom ketchup, 1 onion, 1 carrot, 1 quart of broth, or the liquor in which it was boiled.

Cut the meat from the remains of a boiled calf's head into small pieces of about 2 inches across; put a quart of broth, or the liquor in which the head was boiled, into a stewpan, with the carrot, onion, mace, and herbs; boil it until reduced to nearly half the quantity; then strain it through a hair sieve, and add the wine, the juice of the lemon, mushroom ketchup, and a piece of butter rolled in flour. Lay in the slices of head, and when gradually heated, let them just boil up. Then serve on a hot dish, with rolled bacon, and forcemeat balls as a garnish.

VEAL CUTLETS.—Time, 12 to 15 minutes.—A veal cutlet, 1 bunch of sweet herbs, bread-crumbs, nutmeg, peel of ½ a lemon, yolks of 2 eggs, 1 oz. of butter, a little flour and water.

Let the cutlet be ½ an inch thick, and cut it into pieces the size and shape of a crown piece; chop the herbs fine; mix them with the bread-crumbs. Brush the cutlets over with yolk of egg; then cover them with the bread-crumbs and herbs, fry them lightly in butter, turning them when required; take them out when done. Put an ounce of fresh butter with the grated peel of the lemon, a little nutmeg and flour; pour a little water into the frying-pan, and stir the butter, flour, and lemon-peel into it; then put the cutlets into this gravy to heat. Serve them piled in the centre of the dish, with thin rolls of lemon as a garnish.

CALF'S LIVER AND BACON.—Time, ¼ of an hour.—Calf's liver, bacon, 1 lemon, a small piece of butter, a little flour, pepper, and salt. Well soak the liver; then dry it in a cloth, and cut it into thin narrow slices; cut an equal number of thin slices of bacon as you have of liver, fry the bacon *lightly*, and keep it hot; then fry the liver in the same pan, seasoning it with pepper and salt, and dredging over it a little flour. When done arrange it round the dish, with a roll of bacon between each slice. Pour off the fat from the pan, put in a piece of butter rubbed in flour; squeeze in the juice of the lemon, and add a cupful of hot water; boil it, and pour it into the centre of the dish.

PORK.—Pork must be very much more dressed than all other meats, except veal. It should, therefore, be placed at a considerable distance from the fire, and thus get well warmed through before the skin begins to get dry and brown.

TO MAKE SAGE-AND-ONION STUFFING FOR ROAST PIG OR ROAST PORK.—Time, 25 to 30 minutes.—2 large onions, double the quantity of bread-

crumbs, 3 teaspoonfuls of chopped sage, 2 oz. of butter, 1 egg, pepper and salt.

Boil the onions in two or three waters, to take off the strong taste in them; then drain them, chop them up fine, and mix them with the bread-crumbs, the minced sage, the butter, pepper, and salt. Mix the whole with the well-beaten yolk of an egg to bind it.

To Boil Bacon.—Time, 1½ hour for 2 or 3 lbs.—If very soft, soak it in soft water two hours before cooking. Put it into a saucepan with plenty of water, and let it boil gently. If a fine piece of the gammon of bacon, it may when done have the skin, as in hams, stripped off, and have finely-powdered bread-raspings strewed over it.

To Boil Pickled Pork.—Time ¾ of an hour to 4 lbs.—The belly part is considered delicate. It should be nicely streaked. Boil it gently. Serve it with green as a garnish round it.

To Boil a Hand of Pork.—Time, 1 hour.—If the pork should be very salt, it will require to be soaked for nearly two hours before boiling. Boil it, and serve with pease-pudding and greens in a separate dish.

To Boil a Ham.—Time, 4 or 5 hours.—A blade of mace, a few cloves, a sprig of thyme, and two bay leaves. Well soak the ham in a large quantity of water for 24 hours, then trim and scrape it very clean, put it into a large stewpan with more than sufficient water to cover it; put in the mace, cloves, thyme, and bay leaves. Boil it for 4 or 5 hours, according to its weight; and, when done, let it become cold in the liquor in which it was boiled. Then remove the rind carefully, without injuring the fat; press a cloth over it to absorb as much of the grease as possible, and shake some bread-raspings over the fat. Serve it cold, garnished with parsley. Ornament the knuckle with a paper frill.

To Choose Bacon.—Excellent young bacon can be thus known:—The lean will be tender and a bright color; the fat firm and white, yet bearing a pale rose tinge; and the rind thin. Rusty bacon has yellow streaks in it.

Bacon and Eggs.—Cut the bacon in thin slices and fry it. When the bacon is done fry the eggs in the same pan. Break each egg separately in a cup, and then throw it quickly into the pan. Lay a fried egg on each slice of bacon.

To Steam Bacon.—Time, 20 minutes to the pound.—It is a mistake to boil bacon. It should be steamed. No waste then takes place as to quantity, and the flavor is preserved.

Scrape the outer rind or skin well, wash the bacon, put it in a steamer over a pot of boiling water, and steam it for as long as required by the weight.

Serve it with veal or fowl, or by itself with greens.

To Roast a Pig's Head.—Time to roast, ½ an hour.—½ oz. of sage, 1 large spoonful of salt, 1 dessertspoonful of pepper.

Boil it till tender enough to take the bones out; then chop the sage fine, mix it with the pepper and salt, and rub it over the head. Roast it at a good fire; baste it well; make a good gravy, and pour over it. Apple sauce is eaten with it.

Poultry and Game.—Roast Turkey.—Time, according to size, from 1½ hours to 2 hours or 2½ hours.—½ pint of forcemeat of veal or sausage meat, and a little butter.

To truss the bird: Pick the bird carefully, and singe off the down with a piece of lighted white paper; break the leg-bones close to the feet, hang it on a hook, and draw out the strings from the thighs; cut the neck off close to the back, but have the crop skin long enough to turn over the back; remove the crop, and with the middle finger loosen the liver and the gut at the throat end; cut off the vent, remove the gut, take a crooked wire and pull out the gizzard, and the liver will easily follow. But be careful not to break the gall-bladder; if you do it will spoil the flavor of the bird, by giving it a bitter taste, which no after efforts of washing can remove. Do not break the gut joining the gizzard either, lest the inside

become gritty. Wipe the inside with a wet cloth; then cut the breast-bone through on each side close to the back, and draw the legs close to the crop; put a cloth on the breast, and beat the breast-bone down with a rolling-pin till it lies flat. Scald the feet, peel off the outer skin, and cut away the claws, leaving the legs on. Fill the crop with stuffing, and fasten the skin of the neck over the back with a *very* small skewer. Then put a long skewer into the pinion and thigh, through the body, passing it through the opposite pinion and thigh. On the other side put a small skewer in the small part of the leg, close on the outside of the sidesman, and push it through. Clean the liver and gizzard and tuck them between the pinions, and turn the point of the pinions on the back; pass a string over the points of the skewers, and tie it securely over the back. Cover the breast with a sheet of paper buttered. Then place the bird at some distance from a *very good* and bright fire, keep the heat well to the breast, put 4 oz. of butter in the dripping-pan, and baste it frequently. Just before it is finished dressing remove the paper, dredge it lightly with flour, and baste it with the butter, so as to brown and froth it. Serve it with good brown gravy poured over it, and garnish it with small fried sausages. Sauce, bread sauce.

To Truss a Goose.—Cut the feet off at the joint, and the pinions off at the first joint. Cut off the neck close to the back, leaving the skin of the neck long enough to turn over. Pull out the throat and tie a knot at the end. Loosen the liver, &c., at the breast end with the middle finger, and cut it open between the vent and rump. Draw out all the entrails excepting the soal (or soul), and wipe out the inside. Beat the breast-bone with a rolling-pin, put a skewer into the wing, and draw the legs up close; put a skewer through the middle of the legs and through the body; do the same on the other side. Put another skewer in the small of the leg, turn it close down to the sidesman, run it through, and do the same on the other side. Cut off the end of the vent, and make a hole large enough for the passage of the rump, as by that means you will better secure the seasoning in its place.

To Roast a Goose.—Time, a large goose, 2 hours; a small one, 1½ hours.—Sage-and-onion stuffing, some good gravy.—Stuff the goose inside with sage-and-onion stuffing; roast it before a brisk fire; keep it frequently basted, and when done remove the skewers, place it on a dish, and pour a little good gravy round it. Serve with apple sauce, and a little gravy in a tureen.

To Roast Ducks.—Time, ¾ of an hour to 1 hour.—Ducks are trussed in the same manner as geese; except that the feet must be left on, and turned close to the legs. Hang the ducks one day; stuff one with sage-and-onion stuffing, season the other with pepper and salt in inside. Roast them at a bright fire, and keep them well basted. A short time before serving, dredge them lightly with flour, and baste them with butter; serve them with a little gravy poured *round* them, and a little of the same gravy in a tureen. The giblets can be made into a pie.

To Truss a Roast Fowl.—The fowl must be picked and singed; the neck cut off close to the back. Take out the crop, and with the finger loosen the liver and other parts at the breast end. Put a skewer through the middle of the leg, and through the body, and do the same on the other side. Put another skewer in the small of the leg, and through the sidesman. Do the same on the side, and then put another through the skin of the feet, which should have the nails cut off; clean out and wash the gizzard, remove the gall-bag from the liver, and put both liver and gizzard under the pinions.

To Roast a Fowl.—Family Receipt.—Time, 1 hour.—1 large fowl; 2 or 3 large spoonfuls of bread-crumbs, pepper and salt, ½lb. of butter.—Prepare the fowl for roasting; put into the inside the bread-crumbs, seasoned with pepper and salt, and a piece of butter the size of a large walnut. Roast it at a clear fire, basting it well with butter; and just before it is done, dredge it with flour, and baste again with butter. When done, add a little

warm water to the butter in the dripping-pan, or a little *very thin* melted butter, and strain it over the fowl. Serve with bread-sauce, or a little gravy in a tureen if preferred.

To Truss Boiled Fowls.—Pick and prepare the fowl as for roasting. Then cut off the nails of the feet, and tuck them down close to the legs. Put your finger into the inside and raise the skin of the fowl; then cut a hole in the top of the skin, and put the legs under. Put a skewer in the first joint of the pinion, and bring the middle of the leg close to it; put the skewer through the middle of the leg and through the body; do the same on the other side. Open the gizzard, remove the contents, and wash it well; remove the gall-bladder from the liver. Put the gizzard and the liver in the pinions, turn the points of the pinions on the back, and tie a string over the top of the legs.

To Boil Fowls or Chickens.—Time, 1 hour for a large fowl, ¾ for a medium size, ½ an hour for a chicken.—After the fowls or chickens are trussed, fold them in a nice white floured cloth, and put them into a stewpan; cover them with hot water, bring it gradually to a boil, and skim it carefully as the scum rises; then let them simmer as *slowly as possible.* When done, put them on a dish, remove the skewers, and pour over them a little parsley and butter. Boiled tongue, ham, or bacon is usually served to eat with them.

To Truss and Roast Pigeons.—Time, 20 to 30 minutes.—Wash the pigeons thoroughly, and wipe them dry before putting them to the fire. Cut off the head and neck, truss the wings over the back, and cut off the toes at the first joint; season the insides with pepper and salt, and put a piece of butter into the body of each bird. Roast them before a clear fire, basting them well. Add a little water to the butter in the dripping-pan, with a large spoonful of gravy, and pour it round the birds. Bread sauce.

To Truss and Roast a Partridge.—Time, 25 to 30 minutes.—Partridges should hang a few days.—Pluck, draw, wipe the partridge; cut off the head, leaving sufficient skin on the neck to skewer back; bring the legs close to the breast, between it and the side bones, and pass a skewer through the pinions and the thick part of the thighs. If the head is left on, it should be brought round, fixed on to the point of the skewer; but it is generally removed from the bird when dressing it. Roast them and serve with a little gravy poured over the birds, and bread sauce and gravy in tureens.

To Truss and Roast a Pheasant.—Time, from ½ an hour, according to size.—After the pheasant is picked and drawn, wipe the inside, and truss it in the same way as a partridge. If the head is left on, which it ought to be, bring it round under the wing, and fix it on the point of the skewer. Serve as roast partridge.

To Truss a Hare.—Cut off the fore legs at the first joint, raise the skin of the back and draw it over the hind legs; leave the tail whole; then draw the skin over the back, and slip out the fore-legs. Cut the skin from the neck and head, skin the ears, and leave them on; clean the vent, cut the sinews under the legs, bring them forward; run a skewer through one hind leg, through the body, and the other hind leg. Do the same with the fore-legs, lay the head back, put a skewer in the mouth, through the back of the head and between the shoulders. Rinse the inside, fill it with veal stuffing sew up the body, and pass a string over it to secure the legs on the skewers.

To Roast a Hare.—Time, 1½ hours to 1½ hours, or 2 hours.—A hare, some veal stuffing, milk, butter, and brown gravy.—After the hare is skinned and prepared, wipe it dry; fill the belly with veal stuffing, and sew it up. Draw the fore and hind legs close to the body, and pass a skewer through each. Tie a string round the body, from one skewer to the other, and tie it above the back; fix the head between the shoulders with another skewer, and be careful to have the ears on. Place it at some distance from the fire when first it is put down, and baste it with milk and water for a short time and afterwards with butter. Just before it is done, dredge it with flour and baste it with butter: when done, remove the skewers, and pour a little

good gravy in the dish. Serve with gravy in a tureen, and red-currant jelly.

To Truss and Roast Rabbits.—Time, to roast ¾ of an hour.—Empty, skin, wash and soak the rabbit; stuff it with veal stuffing; skewer back the head between the shoulders; cut off the fore-joints of the legs and shoulders, draw them close to the body, and pass a skewer through them. Roast it in the same manner as the hare.

To Truss Boiled Rabbits.—After skinning the rabbit wash it in cold water, and then put it into warm water for about 20 minutes to soak out the blood. Draw the head round to the side, and secure it with a thin skewer run through that and the body. Put the rabbit into a stewpan of hot water, and let it boil gently until tender: when done, place it on a dish, and smother it with onion sauce, or with parsley and butter.

Potatoes—Boiled.—Time, from 18 to 20 minutes after the water boils; large ones ½ an hour.—Pare the potatoes and throw them into cold water; then put them into a saucepan, cover them with cold water, and a pinch of salt: when the water boils check it several times by throwing cold water in, as the slower they are boiled the better. When done, throw away the water and sprinkle a little salt over them; put them at the side of the fire to dry, with the lid of the saucepan off, and then serve them quickly with the lid of the dish raised.

To Steam Potatoes.—Time, 20 to 40 minutes.—Pare the potatoes thin, and throw them into cold water for 5 minutes; then put the steamer over the saucepan filled with boiling water, and let them steam as directed, or until a fork goes through them easily. Then take them up and serve them quickly, or they will lose their color.

Baked Potatoes.—Time, 1 hour.—Take as many large potatoes as you wish, and wash them clean; then wipe them dry, and put them into a quick oven for 1 hour. Serve them in a napkin, with cold butter and pepper and salt.

Fried Potatoes.—Time to fry, 10 minutes.—Boil some potatoes in their skins; when cold, peel them and cut them in slices a ¼ of an inch thick, and fry them in butter or beef dripping a nice delicate brown. When done, take them out with a slice, to drain any grease from them, and serve piled high on a dish; or, they may be chopped up small, seasoned with pepper and salt, and fried lightly in butter, turning them several times, that they may be nicely browned.

To Mash Potatoes.—Time, ½ an hour, or ¾ of an hour if large.—Potatoes, a piece of butter, a little milk, and salt.—Take off the skins of the potatoes, and lay them in cold water for an hour; then put them into a saucepan with a little salt, cover them with water, and boil them. When done, drain the water from them, put them into a bowl, and mash them fine. Melt a piece of butter the size of a large egg with a little milk; mix it well with the mashed potatoes until they are a smooth paste, taking care the potatoes are not too wet; then put the mash into a dish, piled up; smooth it with a knife to serve, or it may be improved by browning them in the oven, or in a Dutch oven before the fire.

To Boil Broccoli.—Time, 10 to 15 minutes if small; 20 to 25 minutes if large.—Two or three heads of broccoli, 2 quarts of water, and a little salt. Strip off the dead outside leaves, and cut the inside ones even with the flower; cut off the stalk close, and put them into cold salt and water for an hour to cleanse from insects; put them into a large saucepan of boiling salt and water, and boil them quickly with the saucepan uncovered. When tender, take them carefully out, drain them dry, and serve them, with a little melted butter poured over them, and some in a separate tureen.

To Boil Cabbage or Savoys.—Time, a large cabbage or savoy, ½ to ¾ of an hour; young summer greens, 12 minutes.—Cut off as much of the stalk as convenient, and cut the cabbages across twice at the stalk end, unless very large, and then they must be quartered; wash them, drain them in a cullender, and put them into a saucepan of *boiling water* with a spoonful

of salt; press them down frequently, and let them boil very quickly until tender, keeping the saucepan uncovered. When done, drain them through a cullender, covered over to keep them warm, or take them carefully out with a slice. Serve them up very hot, arranged in quarters round the dish.

Turnips.—Time, 1 hour to 1¼; young ones 20 minutes.—Turnips, a spoonful of salt to every gallon of water.—Pare the turnips, and cut them into quarters; put them into a saucepan of boiling water and salt in the above proportion, and boil them until quite tender; then drain them, and press them through a cullender with a wooden spoon, and put them into a saucepan with a piece of butter and a little pepper; stir them over the fire until very hot, and thoroughly mixed. Dish them up, and serve them with boiled mutton, &c., &c.

To Boil Broad Beans.—Time, 15 minutes if young, 20 to 25 minutes if of a moderate size.—1 peck of beans, ½ gallon of water, 1 large spoonful of salt.—Shell the beans, put them into a saucepan of boiling salt and water, and boil them quickly as above directed. When done, drain them, and serve them with parsley and butter in a separate tureen. Boiled bacon should be served with broad beans.

To Boil French Beans.—Time, 15 to 20 minutes.—French beans, a little salt and water.—Cut off the tops and bottoms of the beans, and remove the strings from each side; then divide each bean into three or four pieces, cutting them lengthwise, and as they are cut put them into cold water with a little salt. Drain the beans, and put them into a saucepan of boiling water. Boil them quickly with the saucepan uncovered, and as soon as they are done drain them in a cullender. Dish and serve with a small piece of butter stirred into them.

To Boil Green Peas.—Time, 12 to 15 minutes if young, 20 to 25 if large.—½ peck of peas, a knob of butter, a sprig or two of mint, and a teaspoonful of white sugar, if you like.—Shell the peas, and put them into a saucepan of boiling water with a spoonful of salt, and the mint; let them boil with the pan closely covered. When tender, strain them through a cullender, and put them in a dish with a bit of butter stirred into them, a very little pepper, and the mint on the top.

To Boil Carrots.—Time, 26 minutes; if large, 1½ to 1¾ hours.—When young, carrots only require washing without scraping, and the skin wiped off if necessary after they are boiled. Put them into a saucepan, with hot water to cover them, and a little salt; let them boil fast; then take them out, and if necessary rub off the skins and put them into a dish. If old carrots, scrape the skins very clean, and wash them; if large, cut them in slices and boil them in plenty of salt water until they are tender; put them in a dish and serve.

To Boil Artichokes.—Time, ½ to ¾ of an hour.—2 large spoonfuls of salt and a piece of soda the size of a sixpence to every gallon of water.—Gather the artichokes two or three days before they are required for use. Cut off the stems, pull out the strings, and well wash them. Put the artichokes with their tops down into a saucepan of boiling water, with the soda and salt in the above proportions. If the leaves come out easily they are done; take them out and lay them upside down to drain. Serve them on a napkin, with a tureen of melted butter; or, they may be placed on a dish without the napkin, and a little butter served with them.

To Boil Jerusalem Artichokes.—Time, 20 minutes.—To each gallon of water 2 large spoonfuls of salt.—Wash the artichokes, peel and cut them into a round or oval form, and put them into a large saucepan of cold water, with salt in the above proportion; they will take 20 minutes from the time the water boils to become tender. When done, drain them, and serve them with a little melted butter poured over them.

To Boil Asparagus.—Time, 15 to 18 minutes after the water boils.—1 tablespoonful of salt to ½ gallon of water.—Scrape clean all the white part of the stalks from the asparagus, and throw them into cold water; tie them

up in bundles, cut the root ends even, and put them in a piece of muslin to preserve the tops. Have ready a wide stewpan with the salt and water boiling; lay in the asparagus, and boil it quickly until it is tender. Have a thin slice of toasted bread, cut in square pieces, laid at the bottom of the dish; take up the asparagus, lay it on the toast with the white ends upwards and the points meeting in the centre. Serve with butter in a tureen.

To Boil Parsnips.—Time, 1 hour to 1½ hours; if small, ½ hour to 1 hour.—1 large spoonful of salt to ½ gallon of water.—If the parsnips are young they require only to be scraped before boiling; old ones must be pared thin and cut into quarters. Put them into a stewpan of boiling salt and water, boil them quickly until tender; take them up, drain them, and serve them on a vegetable dish.

They are generally served with boiled beef, pork, or salt cod, and also added as a garnish with boiled carrots.

To Boil Beetroot.—Time, 1 hour, 1½ hours, or two hours.—Beetroot, vinegar, salt and pepper.—Winter beets should be soaked over night, and washed very clean; put them into a stewpan of boiling water, and boil them quickly. When done, put them into cold water, and rub off the skins with your hands; then cut them into thin slices, put them into a dish, and pour over them some cold vinegar; add a little salt and pepper. If the beetroot is in the least broken before dressed, the color will be gone entirely.

To Boil Vegetable Marrow.—Time, 10 to 20 minutes.—Marrows, 1 large spoonful of salt to ½ a gallon of water.—Peel the marrows, and put them into a saucepan of boiling water and salt: when tender, take them out, and remove the seeds; cut them into quarters if large, if not, halve them; serve them in a vegetable dish on toast, with a tureen of melted butter sent to table with them.

To Make Crust for Pies, Tarts, and Puddings.—Make pastry with clean *cold* hands; dip your hands in cold water (after washing them in hot water) before you begin, or your crust will not be good. Crust for company or the master's table is made with butter; for home or the servants, of clarified dripping or lard. Look to the oven; if it is too cold it will make your crust heavy, if too hot it will burn it. Try it, by baking a tiny piece of crust in it first. Make a little hole in the top crust of meat pies to let out the gas.

Family Puff Paste.—1 lb. of sifted flour, ¼ lb. of lard, a little salt, ¼ lb. of butter.—Put the flour in a bowl, and work into it the lard and a little salt. When it is well mixed with the flour, add sufficient cold water to bind it together; then strew some flour over the paste-board; flour the rolling-pin, and roll out the paste to ½ an inch in thickness; then divide the butter; place one half of it in the centre of the paste, fold it over, and roll it out twice; then add the other part of the butter, fold it again, forming a square, and roll it out 3 times, repeating the folding over of the paste each time: when it will be fit for use.

Cheap and Very Light Crust for Pies, &c.—5 oz. of fresh beef dripping, 1 lb. of flour.—To be mixed with *hot* water, *not* boiling, and a little white sugar. These must be put together as lightly as possible, and the flour and dripping must be mixed on the paste-board with a knife. Omit the sugar if for meat pies.

Suet Crust for Puddings.—1 lb. of flour, 6 oz. of beef suet, and cold water.—Chop the suet as *fine* as possible, rub it well into the flour; mix it with a knife or wooden spoon to a very smooth paste, with a little water, and roll it out for use.

Beef or Rump Steak Pie.—1½ or 2 lb. of beef or rump steak, a little pepper, salt and cayenne, a little water or gravy if you have it, a large spoonful of ketchup, yolk of 1 egg, some paste.—Cut the meat into small pieces with a very little fat, dip each piece into flour, place them in a pie-dish, seasoning well with pepper, salt, and cayenne; fill the dish sufficiently with slices of the steak to raise it in the middle; half fill the dish with water or gravy left from any roast meat, and a spoonful of ketchup; put a

border of paste round the edge of the pie-dish; moisten it, and lay the crust over it; cut the paste even with the edge of the dish all round; ornament it with leaves of paste, and brush it over with the beaten yolk of an egg. Make a hole in the top, and bake it in a hot oven.

Mutton Pie, Veal-and-Ham Pie, are done in the same way, only veal pie often has hard-boiled eggs put in it.

Pigeon Pie.—Time to bake, 1¼ hours.—2 or three pigeons, a rump steak, a little gravy, 2 oz. of butter, pepper and salt; crust.—Lay some paste round the sides and edge of a pie-dish; sprinkle pepper and salt at the bottom, and put in a thin rump steak; pick and draw the pigeons, cut off the feet, and press the legs into the sides; put a piece of butter and pepper and salt in the inside of each, and lay them in the dish with their breasts upwards, and the necks and gizzards between them; add pepper and salt and a wine-glass of water; put a thin paste over the top, and brush it over with water; then put a crust ½ an inch thick over that, cut it close to the dish, and brush it over with beaten egg; ornament the top, and stick 4 of the feet out of it, and bake it. When done, pour in a little gravy. You may leave out the steak if you like.

Beefsteak Pudding.—Time to boil, 2 hours, or a little longer.—1 lb. of flour, 6 oz. of chopped suet, a little salt, 1½lb. of steaks, pepper and salt to taste, water.—Make a paste of the above quantity of flour, suet and salt. Butter a round-bottomed basin, line it with paste, turning a little over the edge; cut up the steak into small pieces, with a little fat, flour them lightly, season highly with pepper and salt; then lay them in the basin, pour over them ½ a cupful of water, cover the top of the basin with paste, pressing it down with the thumb; tie the basin in a floured pudding-cloth, and put it into a saucepan of boiling water, keep it boiling for 2 hours, occasionally adding a little water. When done untie the cloth, turning the pudding over on a dish, and take the basin carefully from it.

All meat puddings are made in the same way.

Apple, Gooseberry, Currant, or Other Fruit Puddings.—Time to boil, 1½ hours.—Fruit, suet, crust, sugar.—Line a well-buttered basin with suet paste, fill it with apples pared and cored, a slice or two of lemon peel cut thin, or a few cloves; moisten the edges of the paste, cut out a piece and put it over the top, press it together, and cut it round the edge; put the basin into a floured cloth, and tie it over. Put it into a saucepan of boiling water and boil it. Serve on a hot dish.

All fruit puddings are made in the same manner; sugar may be added if preferred.

A Good Plain Plum Pudding without Eggs.—Time to boil, 3½ hours. 1 lb. of currants, 8 oz. of suet, 1 large spoonful of treacle, a little nutmeg and sufficient milk to mix the whole.—Chop the suet very fine, and mix it with the flour, the currants picked and washed, and the nutmeg; mix all well together with the treacle and milk. Put it into a buttered basin, or floured cloth, and boil it. Raisins stoned and chopped may be used instead of the currants.

Plain Suet Pudding.—Time, 2½ hours to 3 hours.—1 lb. of flour, 4 oz. of beef suet, a pinch or two of salt, ½ pint of water.—Chop the suet *very* fine, and mix it with the flour; add the salt, and work the whole into a paste with the water. Tie the pudding, rolled in the shape of a bolster, in a cloth, and when done cut it in slices, and put butter between each slice. One or two beaten eggs added to the above, with a less quantity of water, may be used, and it may be flavored with ginger or lemon; no butter is then used.

Rolly-polly Pudding with Jam or Treacle.—Time, 1½ hours or more.—Jam, suet paste.—Make a plain suet paste, roll it out thin, and spread the jam evenly over it, leaving a space of an inch all round, or the jam will run out. Roll it in the shape of a bolster, tie it in a floured cloth, and put it into a saucepan of boiling water. Treacle may be spread over the paste instead of jam, and is extremely good.

GERMAN PUDDING.—Time, 3 hours to boil.—½ lb. of treacle, ½ lb. of flour, ¼ lb. of suet, a teaspoonful of carbonate of soda, ¼ pint of milk, 1 oz. of candied peel.—Mix the milk and treacle first; put the soda with the suet, flour, and peel; rub all these together dry. Pour the treacle and milk in, and boil it in a basin.

PLAIN TAPIOCA PUDDING.—Time, 1 hour.—1½ oz. tapioca, 1 pint of milk, 3 eggs, sugar to taste, grated lemon peel.—Soak the tapioca in water until it is soft, add the eggs (well beaten) to the milk, and sugar to taste; stir the tapioca into it, and pour the whole into a buttered pie-dish. Grate a little lemon-peel over the top, and bake in a moderate oven.

CARROT PUDDING.—Time, 2 hours.—Boil and grate 2 carrots, then mix them with a pound of flour, a tablespoonful of sugar; add two tablespoonfuls of currants well mixed with 4 ounces of finely-chopped suet; bake it in a dish, and turn out and cover with white sugar.

PLAIN RICE PUDDING.—Time, 1 hour to bake.—3 eggs, 1 quart of milk, a pinch of salt, 3 tablespoonfuls of rice, 2 spoonfuls of sugar, a little nutmeg.—Well beat the eggs, and stir them into the milk, with the salt, and the rice well washed; add the sugar and a little grated nutmeg. Bake in a quick oven.

RICE PUDDING WITHOUT EGGS.—Time 2 hours.—A teacupful of rice, 1 quart of milk, a little salt and nutmeg, sugar to taste.—Wash the rice in 2 waters, add to it the sweetened milk, salt, and nutmeg. Put it into a buttered pie-dish, and bake in a moderate oven.

TARTS, GOOSEBERRY, CURRANT, APPLE, OR ANY OTHER FRUIT.—Time to bake, from ¾ to 1 hour.—1 quart of gooseberries, rather more than ½ lb. of paste, moist sugar to taste. Cut off the tops and tails from the gooseberries, or pick the currants from their stalks, or pare and quarter the apples; put them into a pie-dish with the sugar, line the edge of the dish with the paste, pour in a little water, put on the cover, ornament the edge of the paste in the usual manner, and bake it in a brisk oven.

OPEN JAM TART.—Time to bake, until the paste loosens from the dish.—Jam, puff-paste, 1 egg.—Line a shallow tin dish with puff-paste, put in the jam, roll out some of the paste, wet it lightly with the yolk of an egg beaten with a little milk, and a tablespoonful of powdered sugar. Cut it in very narrow strips, and lay them across the tart, lay another strip round the edge, trim off the outside, and bake in a quick oven.

TARTLETS AND PATTY-PANS.—Time to bake, ¼ of an hour. Puff-paste, jam.—Line some patty-pans with puff-paste, fill them with any jam or preserve, and bake them lightly.

MINCE PIES.—Time to bake, 25 or 30 minutes.—Puff-paste, mincemeat. Roll out the paste to the thickness of a ¼ of an inch, line some good-sized patty-pans with it; fill them with mincemeat, cover with the paste, and cut it close round the edge of the patty-pan. Put them in a brisk oven. Beat the white of an egg to a stiff froth; brush it over them when they are baked; sift a little powdered sugar over them, replace them in the oven to dry the egg.

MINCEMEAT.—1 lb. of beef suet chopped very fine, 1 lb. of apples pared and minced, 1 lb. of currants washed and picked, 1 lb. of rasins stoned and chopped fine, 4 lb. of moist sugar, ½ lb. of citron, lemon and orange peel, 1 nutmeg, ¼ oz. of salt, ¼ oz. of ginger, ¼ oz. of allspice, ¼ oz. of cloves, all ground fine, juice and peel of 1 lemon, 1 glass of brandy. Mix all these ingredients well together with the brandy, or *any white wine.* Put all into a jar, and keep it in a cool place. Double the quantities if more is required.

GOOSEBERRY FOOL.—1 quart of gooseberries, some water, sugar to taste, 1 quart of new milk, a little grated nutmeg.—Put the gooseberries into a stewpan, with water to cover them; when they begin to turn yellow and swell, drain the water from them, and press them through a cullender, or in a dish; sweeten them to your taste, and set them to cool. Put the milk over the fire, and when it begins to simmer take it off, and stir it gradually

into the cold gooseberries; grate in a little nutmeg. Put the whole into a dish, and serve.

Cheese Pudding.—4 oz. of old dry cheese, 2 oz. of bread-crumbs, 1 egg, or 2 if the eggs be small.—Grate the cheese fine, add to it the bread-crumbs, mix with well-beaten egg. Bake, and serve *directly* it is taken out of the oven, while it is *raised* and high.

Cakes.—An earthen basin is best for beating eggs or cake mixture. Cake should be beaten with a wooden spoon. It is well in making a cake to beat the butter and pounded sugar to a light cream. In common cakes, when only a few eggs are used, beat them until you can take a spoonful up clear from strings. To ascertain whether a cake is baked enough, pass a small knife-blade through it; if not done enough, some of the unbaked dough will be found sticking to it; if done, it will come out clean.

Common Seed Cake.—Time, 2 hours.—2½ lb. of flour, ½ lb. of loaf or good moist sugar, 1 tablespoonful of thick yeast, ½ pint of warm milk, ½ lb. of butter, 1 oz. of caraway seeds.—Mix the pounded loaf sugar, or good moist, with the flour, mix the yeast and warm milk with a sufficient quantity of flour to make it the thickness of cream, and pour it into the middle of the flour and sugar, and set it in a warm place for 1 hour; melt the butter to an oil, and pour it into the middle of the sponge, with the seeds and sufficient milk to make the dough of a middling stiffness; line a tin with buttered paper, put in the mixture, and again set it before the fire to rise; bake in rather a hot oven for 2 hours. When done, brush the top over with milk.

Plum Cake.—Time, 1 hour to 1½ hours.—1 lb. of flour, ¼ lb. of sugar, 6 oz. of butter, ½ lb. of currants, a small teaspoonful of carbonate of soda, ½ pint of milk, and 2 eggs.—Rub the butter into the flour and sugar; mix the soda *thoroughly* with the milk, which must be cold; mix all well together, put it into a buttered tin, and bake *immediately*.

Gingerbread Cake.—Time, ¾ of an hour.—½ lb. of butter, lb. of sugar, ½ lb. of treacle, 1 lb. of flour, ½ oz. of ginger, 1 teaspoonful of carbonate of soda, 4 eggs.—Put the butter, sugar, and treacle into a saucepan together, and place it over the fire to melt; well beat the eggs, and stir the butter, sugar, and treacle into them; add the powdered ginger and soda, stir all together into the flour, and bake.

Bread Cake 1½ lb. of dough, ½ lb. butter, ½ lb. of sugar, ½ lb. of currants, 3 eggs, ½ a teaspoonful of allspice, ½ a nutmeg.—Beat the butter, sugar, and eggs well together, then work it into the risen dough, adding the spice and currants picked and washed; make it into a loaf, and bake it the same as bread.

Lemon Cheesecakes.—¼ lb. of warmed butter, peel of 2 lemons, juice of 1, ½ lb. of loaf sugar, a few almonds, puff-paste.—Just warm the butter, stir into it the sugar pounded fine, and when dissolved mix with it the peel of 2 lemons grated and the juice of 1 strained; mix all together and pour it into patty-pans lined with puff-paste; put a few blanched almonds on the top of each.

Cheap Blanc Mange.—1 quart of new milk, 1 oz. of isinglass, 2 tablespoonfuls of boiling water, ½ lb. of loaf sugar, 1 large lemon, a stick of cinnamon.—Pour the boiling water over the isinglass, rub part of the sugar on the lemon, and when the flavor is extracted; put it with the remainder of the sugar into a stewpan with the milk and the cinnamon; let it all simmer until the sugar and the isinglass are dissolved, then strain it through muslin into a jug, strain it again, and then pour it into a china-mould, and let it stand all night in a cold place. Dip the mould into cold water before the blanc mange is poured into it.

Plain Boiled Custard.—Time, 20 minutes to infuse the peel, 10 or 15 to stir the custard.—1 quart of milk, 8 eggs, peel of 1 large lemon, 3 laurel leaves, ½ lb. of loaf sugar.—Pour the milk into a very clean saucepan with the laurel leaves and the peel of the lemon, set it at the side of the fire for 20 minutes, and when on the point of boiling strain it into a basin to cool;

then stir in the powdered sugar and well-beaten eggs; again strain it into a jug, which place in a deep saucepan of boiling water, and stir it one way until it thickens; then pour it into a glass dish or into custard cups.

Ground Rice Cream.—Time, 3 minutes.—4 large spoonfuls of ground rice, yolks of 4 eggs, whites of 2, 1 pint of new milk, 2 oz. of loaf sugar. Mix the rice very smooth with a little milk; add the yolks of the eggs well beaten, and the whites of 2; add the sugar pounded; boil a pint of milk, pour it over the rice and eggs; boil it 3 minutes, and put it into a mould; when cold, turn it out, and serve plain or with jam round it.

Black or Red Currant Jam.—Time, ¾ of an hour to 1 hour.—To every 1 lb. of fruit, 1 lb. of sugar.—Gather the currants on a fine day, and pick them from the stalks. Put them into a preserving pan with the sugar broken into small pieces. Bring it gradually to a boil, and then let it simmer, removing the scum as it rises, and stirring the jam constantly. When done, put it into pots with brandy paper, or paper steeped in starch, over them, and tie them down closely.

Gooseberry Jam.—Time, 1½ hours.—¾ lb. of loaf sugar to 1 lb. of red gooseberries.—Pick off the stalks and buds from the gooseberries, bruise them lightly, and boil them quickly for 8 or 10 minutes, stirring all the time; then add the sugar, pounded and sifted, to the fruit, and boil it quickly, removing the scum as it rises. Put it into pots, and when cold cover as above.

All jams are made much in the same way.

Pickles.—Use glass bottles for your pickles, also wooden knives and forks in the preparation of them. Fill the bottles 4 parts full with the articles to be pickled, and then fill the bottle with vinegar. Use saucepans lined with earthenware, or stone pipkins, to boil your vinegar in.

To Pickle Red Cabbage.—To 1 quart of vinegar 1 oz. of whole pepper.—Remove the coarse leaves from the cabbage, cut them in long slices or shreds, and put then on a large sieve, well covering them with salt, and let them remain all night; then put them into stone jars, and pour over them some boiling vinegar and whole peppers. Cover them over, and set them by for use.

To Pickle Onions.—Onions, vinegar, ginger, and whole pepper. Peel and put the onions into a stewpan of boiling water; set them over the fire, and let them remain until quite clear; then take them out quickly, and lay them between two cloths to dry. Boil some vinegar with the ginger and whole pepper, and when cold, pour it over the onions in glass jars, and tie them closely down.

To Pickle Walnuts.—Walnuts, vinegar.—For the pickle, to every 2 quarts of vinegar ½ oz. of mace, the same of cloves, black pepper, Jamaica pepper, ginger, and long pepper, 2 oz. salt.—Purchase the walnuts before the shell is hard. Put them into strong salt and water for 9 days, stir them twice a day, and change the water every 3 days; then place them on a hair sieve, and let them remain in the air until they turn black; put them into stone jars and let them stand until cold; then boil the vinegar, &c., 3 times, let it become cold between each boiling, and pour it over the walnuts. Tie the jars down with a bladder, and let them stand 3 months before use.

German Yeast Bread.—Time, 1½ to 2 hours.—2 quarterns of flour, 1 tablespoonful of salt, 2 oz. of dried German yeast, a cupful of water, 1½ pints of warm water.—Dissolve the yeast in a small cupful of cold water, and then add it to 1½ pints of warm water. Put the flour, mixed with the salt, into a deep broad pan; make a hole in the middle of the flour, and pour in the water and yeast; knead it up quickly, and let it stand near the fire, covered over with a thick cloth, for 1 hour; then divide it into loaves, and bake them according to their size. You may make up a large quantity of flour, and bake the loaves 2 or 3 at a time, if care is taken not to keep the dough too warm.

To Boil Eggs.—Slip the eggs off the spoon gently into boiling water. Boil, for soft eggs, 3 minutes; for white set, 4 minutes; hard eggs, 10 to 15 minutes.

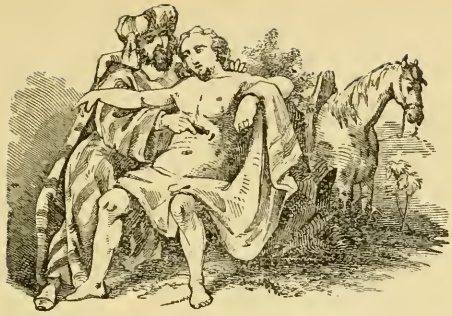
To Poach Eggs.—Eggs, water, a *little* vinegar. Break the egg *whole* into a cup; do not break the yolk. Slip it into boiling water, in which is a little vinegar. When it is set, it is done. Lift it out with a slice, and serve on hot toast.

To Dress a Lobster.—Wipe over the shell of the lobster, when it is boiled, with salad oil. Rub it off again; separate the body from the tail, break off the great claws, and crack them at the joints; split the tail in halves; place the halves of the body upright in the dish; lay the claws and half- tails round it; garnish with parsley.

To Dress a Crab.—1 crab, 2 tablespoonfuls of vinegar, 1 ditto of oil, pepper or cayenne to taste. Empty the shells, chop up and mix the meat with the above ingredients, and put it in the large body shell. Garnish with parsley.

To Make Gruel.—Time, 10 minutes.—1 tablespoonful of patent groats, 2 tablespoonfuls of cold water, 1 pint of boiling water. Mix the groats with the cold water till smooth; then pour the boiling water on them, stirring all the time. Then set it over the fire in a clean saucepan, and boil for 10 minutes. Sweeten as liked, and serve.

To Make Beef Tea.—1 lb. of beef.—Cut the beef into small pieces like dice, put them into a common preserve jar, and keep it in the oven all day, or all night. When all the juice of the meat has been extracted by the heat, add boiling water to it till it is of the strength you require. Season to taste, or put the small pieces into a saucepan, add a quart of cold water to them; boil and skim it; put in the salt when the water boils, and simmer and strain for ¾ of an hour. Strain through a hair sieve and serve. To warm up beef tea, put it in a basin and place it in a basin of boiling water (but the water should not reach the top of of the basin), and warm over the fire.



HEALTH AND MEDICAL DEPARTMENT.

For Physicians, Druggists, Dentists, Perfumers, Barbers, Families, Toilet; Advice to Mothers; Treatment of Infants, Etc., Etc.

MECHANISM OF THE HUMAN BODY.

The Muscular and other Formations of the Body.—There are two hundred and eight bones in the human body, exclusive of the teeth. These bones are composed of animal and earthy materials—the former predominating in youth and the latter in old age—rendering the bones brittle. The most important of the bones is the spine, which is composed of twenty-four small bones, called the vertebræ, one on top of the other, curiously hooked together and fastened by elastic ligaments forming a pillar, so to speak, by which the human frame is supported. The bones are moved by the muscles, of which there are more than five hundred. The red meat of beef, the fat being excluded, is the muscular fabric of the ox. There are two sets of muscles, one to draw the bone one way and another to draw it back again. We cannot better describe the muscles than by comparing them to fine elastic thread bound up in their cases of skin. Many muscles terminate in tendons, which are stout cords such as may be seen traversing the back of the hand, just within the skin, and which can be observed to move when the hand is opened or shut. Every motion you make, even the involuntary one of breathing, is performed through the agency of the muscles. In adults there are about fifteen quarts of blood, each quart weighing about two pounds. This blood is of two kinds, the arterial and venous. This first is the pure blood as it leaves the heart to nourish the frame, and is of a bright vermillion color. The last is the blood as it returns to the heart, loaded with the impurities of the body, to be there refined, and is of a purple hue. Every pulsation of the heart sends out about two ounces of arterial blood, and as there are from seventy to eighty beats in a minute, a hogshead of blood passes through the heart every hour. In fevers the pulsations are accelerated, the waste of the body goes on faster than it can be recuperated, and consquently death ensues if the fever is not checked. The stomach is the boiler, if we may use such a figure, which drives the human engine. Two

sets of muscles crossing each other transversely, turn the food over and over, churning it up in the gastric juice till it has been reduced to the consistency of thin paste. This process requires from two to four hours. Emerging from the stomach, the food enters the small intestines, where it is mixed with bile and pancreatic juice and converted into chyle. These small intestines are twenty-four feet long, closely packed, of course, and surrounded through their whole length with small tubes which act like suckers, and drawing off the chyle, empty it into a larger tube named the thoracic duct, which runs up the back and discharges its contents into the jugular vein, whence it passes in to the heart to assist in forming arterial blood.

Only about one-fourth of the human frame, bones included, is solid matter, chiefly carbon and nitrogen, the rest being water. If a man weighing 140 lbs. were squeezed out under a hydraulic press 105 lbs. of water would run out and thirty-five pounds of residue would remain. A man is therefore, chemically speaking, thirty-five pounds of carbon and nitrogen, diffused through five pailfuls of water.

Food and its Mysteries.—The processes of the assimilation of food to the human economy and the time required in digesting the various articles of ordinary consumption are not much understood. We cannot do a more valuable service than to present our readers with a table of the time required for the stomach to dispose of its load, when the gastric juice is in a healthy state. The table will demonstrate how each article is adapted to the person, by showing how long and how severe each particular preparation tasks the stomach.

Articles of Diet.	Mode of Preparation.	Time of Digestion. H. M.
Rice	Boiled	1 0
Eggs, whipped	Raw	1 30
Trout, salmon, fresh	Boiled	1 30
Apples, sweet and mellow	Raw	1 30
Venison steak	Broiled	1 35
Tapioca	Boiled	2 0
Barley	"	2 0
Milk	"	2 0
Bullock's liver, fresh	Broiled	2 0
Fresh eggs	Raw	2 0
Codfish, cured and dry	Boiled	2 0
Milk	Raw	2 15
Wild turkey	Roasted	2 15
Domestic turkey	"	2 30
Goose	"	2 30
Sucking pig	"	2 30
Fresh lamb	Broiled	2 30
Hash, meat, and vegetables	Warmed	2 30
Beans and pod	Boiled	2 30
Parsnips	"	2 30
Irish potatoes	Roasted	2 30
Chicken	Fricassee	2 45
Custard	Baked	2 45
Salt beef	Boiled	2 45
Sour and hard apples	Raw	2 50
Fresh oysters	"	2 55
Fresh eggs	Soft boiled	3 0
Beef, fresh, lean, and rare	Roasted	3 0
Beef steak	Broiled	3 0
Pork, recently salted	Stewed	3 0
Fresh mutton	Boiled	3 0

Soup, beans	Boiled	3	0
" Chicken	"	3	0
Apple dumpling	"	3	0
Fresh oysters	Roasted	3	15
Pork steak	Broiled	3	15
Fresh Mutton	Roasted	3	15
Corn bread	Baked	3	15
Carrot	Boiled	3	15
Fresh sausage	Broiled	3	20
Fresh flounder	Fried	3	30
Fresh catfish	"	3	30
Fresh oysters	Stewed	3	30
Butter	Melted	3	30
Old strong cheese	Raw	3	30
Mutton soup	Boiled	3	30
Oyster soup	"	3	30
Fresh wheat bread	Baked	3	30
Flat turnips	Boiled	3	30
Irish potatoes	"	3	30
Fresh eggs	Hard boiled	3	30
"	Fried	3	30
Green corn and beans	Boiled	3	45
Beets	"	3	45
Fresh lean beef	Fried	4	0
Fresh veal	Broiled	4	0
Domestic fowls	Roasted	4	0
Ducks	"	4	0
Beef soup, vegetables and bread	Boiled	4	0
Pork, recently salted	"	4	30
Fresh veal	Fried	4	30
Cabbage with vinegar	Boiled	4	30
Pork, fat and lean	Roasted	5	30

Dr. E. M. Hunt thus generalizes on the *facts* of digestion, as set forth in the above table:

Food should pass into the stomach in a finely divided state. The rapidity with which the digestion is performed depends upon various circumstances. Strong emotion, as anger or grief, will retard it; moderate exercise hastens it, and thus the state both of bodyand mind influence it. A usual meal is generally digested in a healthy person in from three to five hours. A mixture of food is not especially objectionable, except as by variety it encourages the appetite, and often leads us to consume more than is needful. Animal food is digested more quickly than vegetable, and solid food more speedily than soups. Oily food is more quickly appropriated by the system than muscular fibre, when agreeing with the stomach. Uncooked oil is more digestible than cooked. Cream and butter are the purest of oils. Boiled meats are most digestible, roasted next, broiled and fried the least so. Bulk is necessary to digestion. The people of cold climates who live much on fats, mix crude matters, sometimes even sawdust, with them, and thus find them more readily digested. Milk is among the most nutritious and digestible of foods. It is considered constipating, but the chief reason is, that it is almost entirely taken up by the system, and no residue left.

With the same exertion, we need richer food in cold weather than in warm. Never eat between meals, unless extra exertion or exposure require it, and then select hearty and quickly digestible food. The stools from vegetable food are more copious than from meats, because vegetable is less nutritious than animal food, and more of them therefore is rejected. As a rule, ripe fruits or vegetables are more digestible than green, and green fruit

stewed more digestible than when eaten in a raw state. Smoked meats are less digestible than fresh, and of smoked or salted meats, the inner portion is more easily digested than the outer part. The inner part is preserved as much by the saltpetre and the exclusion of the air, as by the salting and smoking process, and is in a state more allied to preserved fresh meat. Dried fruits, as prunes, raisins, apples, etc., are unfit to eat unless well cooked, and all unbroken seeds are indigestible. Alcholic stimuli, or condiments of any kind, are not necessary in healthy conditions of the stomach.

Hanging, Recovery from.—As hanging is a very frequent means of committing suicide in this country, it is highly desirable that all persons should be put in possession of the best remedies for restoring animation to a body so found; and that their services may be directed in a proper and beneficial course to the unhappy person, it is necessary that all should know the physiological cause of the suspended animation, so that their efforts may be directed on sound principles, and with scientific views of affording aid. In the first place, the cause of partial or complete death by hanging is not, as erroneously supposed, the consequence of a broken neck, and a pressure of a dislocated bone of the vertebral column on the spinal marrow; for if such were the case, no person could ever by any possibility recover; as surgical art has never yet, nor can discover a means of reducing a luxation of the spinal vertebræ. The cause, then, of death by hanging, results entirely from the pressure of the rope or ligature employed on the large veins returning with their impure blood from the head to the heart; these vessels are called the jugular veins, and the effect of this pressure or obstruction is to cause a rapid collection of blood in the veins of the head, face, and on and in the brain. The arterial supply of blood to these parts being still the same, and the discharging channels blocked up, causes a rapid distension of the veins, which goes on for a few seconds till the delicate texture of which their coats are composed, being unable to bear further dilation, bursts, and their contents are effused into the cavities of the brain, where it immediately presses on the origin of all the vital nerves, and produces that disorganization which results in death; the person dying from apoplexy or venous effusion on the brain. At the same time the blood having been checked at the points of external pressure, forms a clot in the jugular veins, of itself presenting a barrier to the return of blood, should the ligature be removed. *Treatment.*—Immediately cut down the body, or hold it up while another cuts the cord and remove the stricture from the throat; lay the body on its back, bleed from one or other of the jugular veins, or from both arms at once; open the waistcoat and dash cold water in sudden splashes on the face and chest, apply hot bricks close to the soles of the feet, imitate artificial breathing by inflating the lungs by a pair of bellows through one of the nostrils, closing the lips with the hand, and then by pressure on the stomach, expelling the air. As soon a sufficient number of tiles or bricks can have been heated, place them in a row under the spine, and let the body rest on them; rub the neck sharply, where most discolored, with sweet oil and brandy, to cause absorption of the clot formed by the pressure, and place hot bottles or heated bricks between the thighs, and finally extend the friction of oil and brandy with or without hartshorn, over the region of the heart and stomach. These means vigorously applied, without confusion, but with despatch, and in regular order, will, if persevered in sufficiently long, restore animation if any spark of life is left in the body. There is but one other means, the most powerful, but unfortunately the least available, and that is electricity or galvanism. When this agent can be procured the galvanic current is to be passed from the back of the neck and discharged through the stomach, or made to traverse the chest. To recapitulate: the moment the body has been taken down, and the pressure removed, while the bottles are being filled with water and the bricks or tiles placed on the fire to heat, bleed as directed to the extent of twelve or twenty ounces, dash the cold water on the face and chest, and having dried the latter, using the embrocation vigorously, while the lungs are being

inflated, and as soon as possible bring into operation the efficacy of heat to the spine, feet, and thighs, continuing at short intervals the artificial respiration, the frictions and cold effusions on the face.

Sea Bathing.—The most natural and beneficial mode of cold bathing is that afforded by the ocean, its waters possessing a peculiarly bracing influence, which imparts a tone and vigor to the system. Some precautions, however, are necessary. No infants or children of tender years should be immersed in the sea; as the shock occasioned by the cold temperature, as well as the terror imparted, both act prejudicially. Children above six years of age may be bathed with less precaution; but even then they should not enter the water when their bodies are either cold or hot. A warm glow on the skin, produced by a gentle walk, is a test of the condition most advantageous for entering the water. For children two or three plunges will suffice; and those of more advanced years, should never remain above ten minutes or a quarter of an hour in the water. An hour or two about noon will usually be found *the most advantageous time* for sea-bathing; as the sun's rays then exert a sufficient influence upon the temperature of the water, without producing any injurious effect on the head of the bather, especially if it be kept cool by frequent submersion. Sea bathing at the commencement should be practised twice or thrice a week. Afterwards it may used daily with advantage; but not oftener. It may be continued for one, two, or three months, but seldom with advantage beyond the latter period. A flowing instead of a receding tide is to be preferred as more agreeable, salubrious, and less dangerous; the water being purer before it has commingled with the refuse of the beach, and the person in less danger from the reflux of the wave. Persons of consumptive and scrofulous tendency should resort to sea-bathing with extreme caution, and not without medical advice. Adults upon entering the sea, should immerse the head immediately, on account of the apopletic tendency that might otherwise be induced. Persons in more advanced life should not attempt sea bathing without medical advice; and even then the period of immersion should never exceed five minutes.

The following are *general precautions to be observed in bathing.* Do not bathe the lower extremities first. The immersion should be complete at once. Never leap into deep water feet foremost and in an erect position. The best method is to drop into the water, the body and limbs being bent together. Do not stand still or remain motionless in the water. Do not remain long enough in the water to become chilled. Leave the water on the first indication of cramp. Apply a brisk towel all over the body as soon as you leave the water; and dry yourself thoroughly and as expeditiously as possible. Dress yourself as soon as you are thoroughly dry. Do not indulge in violent exercise immediately after a bath, but take a brisk walk just sufficient to heat you.

Hare-Lip.—This disease so called from a fancied resemblance to the appearance of that animal, is one of those distressing malformations that are born with a child. Hare-lip is more frequently found in the upper than in the under lip, and fortunately it is so, for in the latter case, the child is unable to articulate, or retain the saliva in the mouth, creating a source of ceaseless discomfort and pain. The disease consists of a fissure or longitudinal division of one or both lips, having a space between, wider at the bottom and narrowing to an apex at the gum, resembling the letter V reversed, Λ. This condition is called the simple hare-lip, but sometimes the fissure is double, having a pendant piece of the lip in the centre of both fissures. The compound hare-lip is that condition of deformity where the cleft extends along the bones of the palate, over the whole arch of the mouth, while in some cases the bones of the palate are entirely wanting—a most distressing malady, as the child can never articulate, and only with great difficulty eat or drink, as all sustenance passes into the nostrils. Independent of the deformity attending this malformation, the infant so afflicted is prevented from sucking, and must be reared by hand.

The *treatment* of this misfortune is very simple and most satisfactory, and no mother out of apprehension of her child's suffering should neglect to have the deformity cured; which, when in the simple form of the cleft lip, can be effectually done. The operation consists in making the two edges of the fissure even, bringing them together by means of two short silver needles, and keeping them in that position by silk thread passed over their ends like the figure 8, till the process of union has taken place, requiring about eight or ten days, when the needles are withdrawn, and in a week longer the permanent cure will be effected. The best period for performing the operation is between the age of six and twelve months, before the child can entertain any alarm at what is to be done, or by cries and restlessness materially interfere with the success of the operation.

Contagion.—Contagious diseases may be communicated by actual contact of the body, by articles of clothing or furniture, and by the atmosphere. Peculiar atmospheric conditions favor the propagation of disease by contagion, and this especially applies to dirty and crowded places, whence noxious exhalations arise. Old and soiled furniture and clothing, are also much more favorable to the reception of the disease than when new and clean. Wool, cotton, and other loose textures seem particularly apt to attract and retain contagious emanations; whilst, on the other hand, polished surfaces and hard substances are with difficulty impregnated. Chambers in which persons afflicted with contagious maladies are, should be kept scrupulously clean, regularly ventilated, and fumigated two or three times a day. Attendants on the patient should be dressed in silk or other material having a glazed surface; and it will be found an excellent plan to put on a large apron made of oiled silk. The furniture should consist as much as possible of articles having hard and polished surfaces, and instead of being crowded with furniture, the room should contain only such articles as are indispensably necessary. When the patient quits the chamber in which he has lain, every article that has come in contact with his person, should be first fumigated with chlorine in a close apartment, then exposed to the air, and finally washed; the furniture and clothing should undergo an appropriate and thorough cleansing. The bed requires the greatest amount of care; if of wool, it is better destroyed altogether; if of hair or feathers, these should be exposed to a heat of at least 210 degrees by re-baking. With regard to the chamber itself, it should be thoroughly fumigated with the doors and windows shut, and then left open to the influence of the air for several days. And, as a last precaution, the walls, ceiling, wainscot, etc., should be re-washed, papered, and painted. Until all these precautions have been taken, the furniture and clothes should not again be brought into use, and the apartment should remain unoccupied.

Hydrophobia, or dread of water, as the name signifies, is a disease peculiarly affecting the nervous system, caused by the bite and absorption into the blood of the saliva, or *virus*, as it is called, of some rabid or strongly irritated animal, but most frequently of the two domestic species, the dog and cat, though, from the almost analogous symptoms excited in the system by certain accidents, eventuating in what has been called *tetanus*, the two diseases by many medical men have been considered as synonymous. The influence exerted by the mind on the body, both for good and evil, is a fact well known to the most casual observer, but in no instance is that effect exercised with more dangerous consequences than in the disease under notice; for it is unquestioned that many persons have been forced into a state of hydrophobia, simply through the terror inspired by the scratch or abrasion of an animal perfectly in health, though perhaps under a temporary fit of displeasure or pain. The peculiarity of this disease, is the great length of time that usually takes place between the receipt of the accident, or bite, and the disease itself, or the manifestation of the constitutional symptoms; sometimes weeks elapse, at others months, and not unfrequently years have supervened between the cause and the effect.

Symptoms.—At whatever time these may show themselves, they commence with wandering pains over the body, anxiety, restlessness, disturbed sleep, and frightful dreams, the patient starting up in horror and bedewed with cold perspiration; by degrees muscular contractions occur at intervals, weight and oppression of the stomach, a tightness in the throat, and difficulty of swallowing, till suddenly the crowning symptom takes place, and the patient, in attempting to drink, is seized with a sudden horror, and recoils in terror from the wished-for potation; the very sight or sound of water, or the motion of fluid, throwing the body into violent convulsions. From this stage the symptoms rush on to their climax; the countenance is contracted, the eyes wild and staring, the teeth set firmly, and with the tightened lips covered with a ropy foam, or a thin watery saliva pours from them: this state is alternated with shrieks, animal noises, bilious vomitings, convulsive jerks and plunges, till one fearful spasm that draws the body like a bent bow, resting on head and heel, releases the patient from his sufferings.

Treatment.—The hot bath, electricity, blisters, bleeding and opium in immense doses, are the only agents that art can employ in this formidable disease; the most violent measures and the most opposite have been resorted to; but, unfortunately for science, hitherto with but little effect or benefit. In no disease is the old adage of "prevention better than cure" so applicable as in this. For the tranquillity of mind, for the satisfaction of the patient, and for motives of safety, in all cases of bite or abrasion from the tooth of an animal, the part should be cauterized. A tape or bandage being first tied tightly above the part to prevent absorption, the part is then to be washed with warm water, and lunar caustic then applied. If these steps are adopted quickly and effectually, and, if possible, the part sucked or dry-cupped before applying the caustic, and the ligature or pressure continued for some time, there will seldom be any necessity for the painful and questionable practice of excision. The patient's mind must be soothed; an aperient and a sedative given, and a warm poultice applied over the scar. A mode of treating hydrophobia by means of ice, internally, down the spine, over the throat and chest, has been adopted with success, but the cases are too few to warrant pronouncing it as either safe or certain.

Bites of Animals generally result from the teeth of dogs and cats; and, as long as these proceed from a hurt the consequence of a sudden anger in the animal, need provoke no alarm, and the treatment is simple and easy. But when an animal has been excited into passion and kept in a state of irritation for some time, a poison is engendered and mixed with the saliva, that imparts to a wound then inflicted much inflammation, and sometimes considerable danger; especially so if the constitution of the person bitten, at the time should chance to be in a diseased or unhealthy state. In general, however, the bite is harmless enough; but as all such accidents produce a most depressing effect on the mind, and the terror excited by a harmless bite, in some instances, gives rise to the most exaggerated fear, it is always more satisfactory to adopt the same precautions as would have been demanded had the animal been really dangerous.

Treatment.—In cases of trifling abrasion from the teeth of dogs or cats where it is the return snap for an accidental stamp or kick at the animal, and where there can be no reasonable doubt of the health of the animal, all that is really necessary either for precaution or cure, is to wash the part with warm water, applying the nitrate of silver, or lunar caustic, and tie on a hot bran poultice. Where the case is more serious, and the animal has been enraged, tie a garter or piece of tape directly round the limb, above the puncture or wound and between it and the heart, so as to avoid as far as possible all absorption into the system; the part is then to be washed quickly with a sponge and warm water, changing both water and sponge: if cupping glasses are at hand apply one directly over the bites, allow it to remain three or four minutes; remove it and wash away carefully the blood that may have exuded, or whatever moisture may have been forced to the surface, and apply the glass again, and if necessary a third time. When

the cupping apparatus cannot be had, take a wineglass, put a few drops of spirits of wine, spirits of camphor, tincture of myrrh, Friar's Balsam, or sulphuric ether, or brandy if it is pure; light it with a match, and before the flame has burnt out apply it to the part. If the air has been well exhausted the flesh will rise in the glass, and a few drops of blood exude from the orifices. While these measures are being adopted—and they should not occupy more than ten or fifteen minutes—some lunar caustic may have been sent for, which is to be held between a piece of folded rag by one end, while the other dipped in water is rubbed freely over the part, and worked into the punctures; a hot bran or linseed meal poultice is then laid on the cauterized surface, the patient's mind tranquillized, and the limb and body kept in perfect rest. If a glass cannot be made to adhere by the use of the spirits named above, or by exhausting the air by the flame of a taper, let the caustic be applied at once, and the poultice continued till the eschar or blackened cuticle dies and is thrown off. If the wound heals slowly, with an irritable appearance, and small pustules form round it, apply the caustic again, give an occasional aperient of equal parts of blue and colocynth pill, and take as a corrective, in doses of half a tumblerful, four times a day, a decoction of dulcamara, or sarsaparilla. Two ounces of the former, cut small, and boiled from three pints of water to two, and one ounce of the latter, prepared in the same way.

Bites or Stings of Reptiles.—Of these the rattlesnake, the cobra di capello, the whipcord snake, and the viper of our own country are among the most dangerous; and though the potency of the venom ejected from each varies according to the species, it exerts the same characteristic chain of symptoms only more or less intense, the difference being merely in degree and time, as the *virus* of one is more subtle and deadly than that of another. In all cases the infliction of the wound is followed by instant and acute pain discoloration and swelling of the part, sickness, fainting, pain in the back, difficulty of breathing, spasms, extreme drowsiness, coma and death—in the worst cases—within two hours. Hitherto no antidote has been discovered to this quick killing venom, and all that medical aid can do to avert a fatal termination, lies in the speed with which it employs precautionary measures. These consist in, 1st, preventing absorption of the virus into the blood; 2d, in removing as much of the poison as possible from the wound; and 3d, by counteracting with antispasmodics and stimulants, the symptoms that supervene.

The treatment is the same from whatever variety of reptile the injury has been received, only modified according to the amount of danger to be apprehended. It is necessary to state, in order to overcome the natural repugnance of most persons to suck a venomed wound, that the most deadly animal poison is perfectly innocuous unless brought in contact with a cracked or abraded surface, and that it might be dissolved and drunk with impunity, if in its passage to the stomach there were no decayed teeth or excoriation on the lips or gullet. Directly after receiving the injury a string or ribbon must be tied tightly round the limb, above the wound, the part washed well and quickly with warm water, at the same time forcing out with the fingers any blood or exudation that may appear; if proper cupping glasses are not ready, instantly apply the lips and suck the wound with a steady exhaustion, spitting out and washing the mouth before again repeating the process, which should be continued for quite ten minutes. When the cupping glasses are used, the mode advised in the beginning of this article is to be adopted. The punctures are then to be treated with lunar caustic as already described, and a hot poultice applied. The fainting, difficulty of breathing, and symptoms of collapse that supervene, are to be met by doses of ether, brandy, and ammonia, or valerian, lavender and musk, repeated every ten or fifteen minutes, alternated every half hour, for four times, with thirty drops of Fowler's solution of arsenic, taken in a tablespoonful of water. Electricity should be applied to the spine, or, if not at hand, substitute friction with mustard along the spinal column. For

the drowsiness and coma, the patient must be kept constantly walking, and cold water occasionally dashed in the face. Should much constitutional disturbance manifest itself subsequently; the system is to be strengthened and the morbid action corrected by a course of sarsaparilla —compound decoction—alternated with five drops of Fowler's solution of arsenic every six hours, or a compound Plummer's pill twice a day; at the same time a liberal diet, such as wines and tonics as the case may demand.

Burns.—Burns are generally considered serious when they occur on the head, throat, chest and bowels, from the inflammation induced in the important organs immediately beneath these parts. Burns over joints are particularly serious from the consequences so liable to ensue in such situations, namely, the formation of a stiff joint, and contraction of the cuticle, causing the limb to be drawn up or bent. The contraction is so great after all burns, that the greatest circumspection is necessary during the cure to avoid a malformation; for, if the part is kept long at rest, or two parts of the body in contact, such as the chin upon the breast, or the arm by being bent, adhesion will take place, and either a very frightful or most inconvenient permanent disfigurement will be established.

The following remarks should be borne in mind by every one who has anything to do with a burn, and cannot be too firmly impressed on the memory. *First*, that as the exposure to the air of a burnt surface is the cause of the continuance of pain, the part cannot be too soon protected from the atmosphere. *Second*, that burns, if instantly wrapped up and kept excluded from the air, require no medicament whatever, and heal in a few days. *Third*, that when the clothes of a person are on fire, the person is to be instantly enveloped in the carpet, hearth-rug, blanket, coat, or any other article that, by smothering the fire, will extinguish the flames. *Fourth*, that the blister raised by burning is never to be broken, nor burnt clothes adhering to the flesh removed.

Treatment.—In whatever part of the body a burn may be situated, the treatment is the same; the part must be immediately covered with a double fold of wadding, laying the woolly side next the skin. Should pieces of the dress adhere to the cuticle, cut carefully all the loose edges off, and lay the wadding over what remains. If the burn has been extensive, and there is much prostration of strength, and a sinking pulse, brandy, ether, and ammonia must be given every half hour, to rouse the action of the heart, in draughts consisting of a tablespoonful of brandy, half a teaspoonful of sal volatile, twenty drops of ether, and a wineglassful of water; at the same time, to counteract the shivering and sense of cold that usually follow such accidents, apply heated bricks or bottles of hot water, to the feet, thighs, and arm-pits. Should the pain, in spite of the exclusion of air, continue an hour after encasing the part or parts in wadding, give 40 drops of laudanum in one of the above draughts, and repeat the same amount, if necessary, in an hour. This dose, of course, applies to adults; to a child from five to twelve years, from five to ten drops. When the wadding becomes moist from the exudation, on no account remove it, but lay over the moistened dressing another layer of wadding. When the pain and tenderness subside, the part is to be exercised as much as convenient, and the burnt surface kept constantly covered till the new cuticle has formed and the dressings fall off by degrees.

Where neither wadding, wool, nor fine cotton can be procured to envelope the burn, cover the part instantly with handfuls of flour, violet powder, Peruvian bark, or any harmless impalpable powder, adding more whenever moisture appears through the thick cake thus made over it; and continue in the same manner as directed with the wadding, to apply fresh powder as the occasion demands, till the healing state of the burn warrants the application of a poultice, to bring off the collection. When softened and removed by one or two poultices, the part is to be again dusted lightly, or treated with the wadding, to protect the new cuticle. To those possessed

of the domestic articles of medical use, the following mode of procedure is advised as at once the most practical and efficacious.

Immediately pour over the burnt part, wherever it may be,—except the eye or mouth—sufficient of the extract of lead to wet the burn, and directly after, lay smoothly on, a piece of wadding a little larger than the size of the injury, and with the wool next the skin; over this apply a double fold of the same material, and secure it by a loose bandage; keep the patient quiet, and administer tablespoonfuls of brandy and water, or sweetened gruel with brandy, at the same time implicitly follow the previous directions.

Burns on the throat and chest often produce severe and difficult breathing, when, if not relieved, the patient might expire from suffocation. The feet and legs, must, therefore, be plunged into hot water of a sufficient temperature to attract a sudden supply of blood and make them look red, and the effect of this diversion continued by one or two mustard plasters to the feet, or a blister to each thigh.

Burns, the result of acids, must be treated first, by a free application of powdered chalk or magnesia, to counteract the acid, this is then to be washed off, and the wadding or wool applied. Burns caused by quick or slacked lime are to be washed directly with vinegar and water till all the corrosive substance has been neutralized, and then healed by dressing with the extract of lead and the wadding.

Vomiting.—When not the consequence of accidents or injuries to the head, or from hernia, or some affection of the bowels, vomiting or sickness generally proceeds from some derangement of the stomach, or else from the effect of some irritating or poisonous substance received into it through accident or design. In such cases as the latter, an emetic of antimony or ipecacuanha should be taken to expel the noxious substance as quickly as possible. For repeated and exhausting sickness, such as attends a bilious attack, the following draught should be taken every half hour. Take of

Camphor water..... 1 ounce,
Sal volatile.....20 drops,
Spirits of lavender..... ½ drachm,

Mix. A small mustard plaster should be applied to the pit of the stomach, the patient at the same time keeping in an inclined position on his back, as frequently as possible. Sometimes simply lying on the back, drinking a copious draught of cold water, with cold wet napkins applied to the stomach, will relieve the most aggravated cases of vomiting. But where no relief can be obtained, a medical man should be instantly sent for.

Choking.—When any mass of food, such as a piece of meat, potato, or other substance, lodges in the fauces, or the base of the tongue, if in sight, but too far for the fingers to reach, it should be immediately grasped with a pair of pincers, or, what is better, a pair of curling-tongs, and dragged out. If neither are at hand, and as time is precious, press down the tongue with the fingers, and tickle all the surrounding parts with a feather, so as to induce heaving or vomiting. Nature by that action often getting rid of the obstruction. If, however, none of these means present a chance of relief, use the point of the curling-tongs as a probe, and push the obstruction into the gullet. However quickly these operations may have been carried on, the sufferer may have died before the obstacle has been displaced, or become so apparently lifeless as seemingly to render all further steps useless; this, however, is not the case, cold water must be dashed on the face and chest, ammonia applied to the nostrils, and the lungs inflated with air. When the lodgment has been lower down and taken place in the gullet proper—a fact that can be ascertained by an examination of the mouth, and also by the mute indication of the sufferer's fingers—the impediment to its descent to the stomach proceeds from some spasmodic action into which some of the muscular fibres are thrown, causing them to grip the body in its descent and retain it in that position, while its bulk pressing forward on the windpipe, causes the danger to life that results from the accident. Two

or three sudden or sharp slaps between the shoulders, or water dashed abruptly in the face, will often, by producing a sudden gasp, release the spasm and cause the descent of the object; if not, a probe, flexible tube, or a quill, must be employed and the substance pushed past the constriction; when, however, the bulk is too large to be moved by such simple means, and while a messenger is sent for a surgeon to bring the proper instrument, endeavours should be made to keep up a partial supply of air in the lungs, by means of the bellows.

Fainting, or Syncope, as it is professionally called, very often attacks the individual without warning, though at other times, and in those subject to these distressing symptoms, fainting is preceded by well-defined sensations, such as a feeling of distress, languor, and sickness; the sight becomes dim, and the eyes appear covered by a film; an areola or dark circle appears round the orbits; a buzzing, or low singing noise is heard in the ears; the face and lips are pale, a cold perspiration breaks out over the skin; the pulse sinks to a mere flutter, and finally ceases; the body totters, and unless upheld, falls to the ground. The loss of consciousness is sometimes complete; at others, the patient retains a partial amount of recollection; the pallor, too, is occasionally more intense, and corpse-like, the eyes shut, mouth open, the limbs flaccid, and the extremities deadly cold. This state lasts from five minutes to half an hour; a spasm of the chest and a few gasping sobs, each more prolonged than the last, is the first indication of returning consciousness. When the fit is prolonged, it may terminate in epilepsy or convulsions. The causes that predispose to faintings, are an intensely nervous state of the system, a delicate constitution, and extreme debility from whatever cause produced, or a diseased state of the heart. Youth is more subject than age, to fainting; and females more frequently affected by it than males.

Treatment.—When fainting is the result of excessive nervous sensibility, or when it occurs in hysterical women, there is seldom any danger; all that is generally necessary, is to lay the patient on his back in the horizontal position; loosen any string that may compress the chest or neck, open the window, dash water in the face, and apply volatile salts to the nostrils, and give a draught with half a teaspoonful of spirits of lavender, or thirty drops of sal volatile, and twenty of ether, added to the lavender and water, where the fainting threatens to merge in hysteria. Should the case be obstinate, heated bricks or mustard plasters must be applied to the feet or thighs. Where the fainting proceeds from organic disease, the treatment must be guided by the nature of the primary affection.

Frost Bite.—This insidious and dangerous affection of the extremities and parts most exposed to frost, as the feet and toes, hands, fingers, nose, and ears, is the result of exposure to extreme cold; and though persons of a phlegmatic temperament, and a sluggish state of the circulation, are more prone to this misfortune than others, yet it may attack persons of all habits of body, and of all ages. The effect of the sudden application of intense cold, or long continued cold of a less severe character, is, in the first instance, to deaden the nervous sensibility, and next to drive the blood from the part most exposed, and leave it in such a state of torpidity as to be unable to resist the killing effect of the surrounding cold, which finding the part thus unprotected with the vitality of nervous energy, or the warmth of circulation, in reality freezes it to death. Though excessive cold is the cause of death either to a part or the entire body, the amount of cold the frame can bear with impunity is remarkable; the actual danger, as far as frost-bite is concerned, resulting from the sudden *reaction* in the part, from the rise of temperature, or the application of warmth: on this account, the greatest precaution must be observed, in avoiding all abrupt change of temperature, as by forcing the blood suddenly back to the part, inflammation, mortification, and sloughing, must follow. A frost-bite is known by the swelling and discoloration of the part, attended with pain, numbness, and a sense of pricking; the color, at first bright, becoming of a dull brown,

which, if unrelieved, deepens into black. The *treatment* consists in *slowly* and *very cautiously* restoring the circulation, for if the slightest warmth is incautiously applied, mortification is certain to ensue. The patient should therefore be removed into a cold room, and the part rubbed gently with snow, or bathed with cold water, and on no account allowed to enter a room with a fire, or any heated apartment. After half an hour, a small quantity of weak spirits and water may be taken cold; and ultimately the patient put to bed in cold sheets: the treatment of frost-bite resolves itself into the *slow* and *careful restoration of the circulation* in the affected part.

Lock Jaw.—This disease is a violent contraction of the muscles of voluntary motion, attended with tension and extreme rigidity of the parts affected, and receiving particular names from the portion or part of the body affected; thus, when all the muscles of volition are affected in one invisible spasm, the disease is called *tetanus*. When the body is bent *forward*, by the spasm seizing only the anterior muscles; when it is bent *backwards* like a bow, the body resting on the heels and the top of the head, by the disease affecting the opposite class of muscles; or when it is drawn into an arch on the *right* or the *left side*, accordingly as each separate set of muscles are contracted. Besides these four, there is, however, another form, and, as being more frequently met with, of more importance to the general public; and that is that form of tetanus affecting muscles of the jaw and neck, which from their violent contraction firmly shutting the mouth, and contracting the gullet, has been named *trismus*, or locked jaw. In ordinary convulsions or spasms, the contractions and relaxations are alternate, with remissions of ease, whether attended with partial or complete insensibility. The peculiarity of tetanus, however, is that the contraction of the muscles is kept up without any change or abatement; the muscular fibre being grasped in a dead lock of unmitigated intensity to the last, while the involuntary muscles, as those of respiration, are unimpaired, and the intellect of the patient is as clear, and his sensation as acute, as in the soundest health. This disease is divided into the acute and chronic, and into that proceeding spontaneously or from poisons, and called *idiopathic*, and that the consequences of wounds or injuries, greater or less, received by the body, when it is called *traumatic*. As it is only intended to treat of locked jaw, or trismus, in this article, it will be sufficient to observe that the causes which generally induce this form of tetanus are of the traumatic order, and result from erysipelas, wounds of the head, lacerations of the scalp, punctures of the hands and feet, especially with rusty or jagged substances, bites from rabid animals, injuries from machinery, and sometimes from the extraction of a decayed tooth. It is a peculiarity of this fatal disease that the exciting cause is often as insignificant as the consequences are grave. Males are more subject to it than females, and, for one case of idiopathic locked jaw, there are five the result of external injury.

Symptoms.—These commence after the injury, from a quarter of an hour to three or four days, and sometimes as late as ten or twelve weeks, with a stiffness in the back of the head and neck, extending to the shoulders, and very materially impeding the motion of the head; this gradually extends to the throat, rendering talking irksome, and finally, swallowing impossible. The pain and rigidity of the muscles of the throat runs down the breast, and darts sharp pains through the chest, into the back; the muscles of the neck now beginning to plunge and contract, and gradually increasing their tension, drawing the head backwards, at the same time that the lower jaw is drawn upwards till it becomes in such close approximation, that it is impossible to separate them; all the muscles of the throat, cheeks and neck feeling like bars of wood in their rigid contraction. The eyes are dilated, glaring and motionless in their sockets; the tongue, if it has not been protruded and caught in the teeth, has been drawn back into a roll at the base of the mouth; the forehead is dragged up into deep ridges, and the skin of the face is violently stretched up to the ears, where it is raised into wrinkles, giving a wild, distorted, and ghastly look to the countenance; as the last

symptom is added to the series forming the disease, locked jaw is complete. Without proceeding further with the description of trismus, it will be enough to say that the disease is sometimes fatal in fifteen minutes, though the ordinary period may be taken as from four to eight days.

Treatment.—When the disease proceeds from worms, or some internal irritation—the rarest exciting cause—aperient medicines of an active nature are to be given directly, and continued till the cause is expelled; when from splinters or bits of glass, or sharp substances, lodged in the flesh, incisions should be made, and the injured part well cleaned of all cause of irritation, and where a nerve has been injured, it should be divided as soon as possible. Where the constitution is robust, and the patient strong, bleeding should be adopted to a large extent, the hot bath and friction employed, and the muscular contraction overcome by the fumes of tobacco, or by opium, morphia, or aconite; but if the constitution is debilitated, the same result must be effected by camphor, musk, ammonia, and stimulants of wine and brandy, with cold affusions on the head from a height. Besides these, and, in fact, nearly all the remedies of the pharmacopœia, which have been employed with varying success, the wild hemp has of late years been used with more than usual advantage, and still more lately chloroform; but whatever the remedy administered, the dose requires to be very considerable to produce any effect.

Leech Bites, to Stop Bleeding.—*Remedy.* Press steadily for some time with the finger upon the orifice, previously covered with two or three folds of lint or rag. If this does not avail, apply a little muriated tincture of iron on lint, or touch the orifice with nitrate of silver, or with red-hot wire, or pass a fine needle horizontally through the bite, and then twist a piece of fine silk several times round the needle, enclosing the bite by a figure of 8. Or scrape a piece of lunar caustic to a fine point, and inserting it into the bite, hold it there for a second or two. *Observe.* Leech-bites are frequently followed by a suspicious-looking swelling; if this should make its appearance, and remain any length of time, apply a lotion made of half a pint of cold water, containing a teaspoonful of tincture of arnica. For the soothing and healing of leech-bites rapidly, broth made with the fattest part of tripe is an excellent wash.

Housemaid's Knee.—The popular name of a swelling on the bone on the front of the knee: increased by pressure, kneeling, or walking. It is so called because it affects persons who are in the habit of kneeling on cold stones, damp floors, &c.—*First Remedy.* Suffer the part to rest, apply a few leeches, together with warm fomentations; take, also, purgative medicines.—*Second Remedy.* Paint the swelling twice daily with tincture of iodine.

Griping.—This well-known sensation in the bowels is a symptom of diarrhœa, dysentery, and colic. Some medicines are more liable to gripe than others. This inconvenience may be remedied by the addition of the oil of cloves, cinnamon, or essence of ginger. Griping in Children may be remedied by a little magnesia administered once or twice a day. If the gripings are severe, put the child into a warm bath, and give one grain of calomel every three hours till relief is afforded, then give a teaspoonful of castor-oil.

Grocer's Disease.—There is a disagreeable disease attending grocers who have much to do in the handling of sugar. The hands first become chapped, pustules appear upon them, and if they continue to handle sugar, a settled callous ulceration follows. We recommend the use of gloves, made of parchment, to prevent the disease, as well as to assist in curing. Those affected with it, should every night keep their hands in warm water for half an hour, then touch the parts with diluted citron ointment, and put on a pair of soft leather gloves, in which they should sleep. In the morning the proper gloves, above alluded to, should be put on, and the hands by no means allowed to come in contact with the sugar until the disease is entirely removed.

Gum-Boil.—This sometimes arises from exposure to cold, but is caused in the majority of cases by the irritation of a decayed tooth.—*Remedy.* Inflammation of the gum generally goes on to suppuration, to promote which, warm fomentations and poultices may be applied externally. As soon as the matter is formed the abscess may be cut or lanced. Afterwards the mouth should be washed occasionally with an astringent lotion composed of tincture of galls and water, or of twenty or twenty-five grains of sulphate of zinc, dissolved in half a pint of rose-water. When the pain and inflammation have entirely subsided, the decayed tooth should be extracted or stopped by a dentist.

Cold Feet.—This derangement is attributable to defective circulation of the blood. Coldness of the feet mostly comes on at night, and will often prevent a person sleeping long after he has got into bed.—*Remedy.* Half an hour before bedtime walk up and down the room briskly, or run up and down stairs. Rub the feet with the hand or a flesh-brush. Dip them into hot water, without suffering them to remain in any length of time. Drink some warm beverage just before going to bed. In winter-time, wear boots instead of slippers in the house. Do not sit long together, but every now and then get up and walk about. These, and many other simple expedients, may be adopted to prevent this unpleasant sensation.

Chicken Pox.—A complaint almost entirely confined to children. It is a disease of a mild and comparatively harmless character. The symptoms are slight feverishness, succeeded by a number of red spots, which break out on the face and back, followed in a few days by watery bladders.—*Remedy.* Magnesia, one drachm; rhubarb, half drachm; powdered ginger, ten grains; divide into twelve doses, and mix each dose in a little water; administer occasionally while the disease is prevalent. Give cooling drinks, and let the diet be mild.

Miller's Disease.—The powder or dust from corn and flour is apt to injure the throat, lungs, and eyes of millers. This powder has also a sharpness in it that causes a violent itching all over the body. Persons thus employed should be careful to wash off the dusty filth which adheres to the skin, along with the perspiration. They should also make frequent use of melon seeds, whey of cow's milk, and the decoction of melons, for by these means the acrimony of the putrid powder is diluted. When millers are seized with asthma, they must avail themselves of the remedies to be found under that head.

Mouth, Sore.—Take of honey two tablespoonfuls; borax, powdered, half-drachm; mix well together, and take a teaspoonful twice a day. The mixture should be placed in the mouth, little by little, touching the various ulcers that are visible, or can be got at.

Foul Air.—As very serious disorders frequently arise from the presence of foul air, we deem it advisable to give the following among our collection of remedies.—*First Remedy.* Mix two parts of dry chloride of lime with one part of burnt alum; set this in shallow dishes in the room, with or without the addition of water.—*Second Remedy.* Sprinkle the floor with a solution of one ounce of chloride of lime in one quart of water.—*Third Remedy.* Pour one ounce of sulphuric acid upon two ounces of the nitrate of potash in a large teacup, placed in a basin containing hot water.

Foul Air, Suffocation by.—*Remedy.* The foul air should be expelled from the lungs by pressure being made by one person with both hands on the chest, while at the same time a second person, with out-spread hands, presses firmly on the stomach. By this means, the diaphragm, or internal partition between the chest and the belly, will be forced up into the chest, and the lungs compressed into a very small space. By both removing the pressure simultaneously, fresh air will rush down the windpipe; and by thus pressing and relaxing alternately, the act of respiration will be imitated, and every chance of inflating the lungs with fresh air will be obtained. Warm water may be injected into the stomach, clysters of turpentine and water administered, and, among other things, a napkin moist-

ened with a solution of chloride of soda or lime, placed under the nostrils. Tickling the throat with a feather is not without its effect: and shocks of electricity may also be passed through the chest.

Cramp.---An affection usually caused by exposure to cold and damp.---*First Remedy.* Foment the part affected with warm water, with a little mustard mixed in it; drink nothing cold, and take a little brandy and water; put the feet in warm water, and endeavor to produce a perspiration, take two or three times a day a dose of Peruvian bark in a little wine, or a little ginger and water.---*Second Remedy.* Take of water of ammonia or spirits of hartshorn, one ounce; olive oil, two ounces; shake them together till they unite, and rub it on the affected part with the hand.---*Third Remedy* (For severe cases). Take of strong liniment of ammonia, one and a-half ounces; oil of turpentine, one ounce; spirits of camphor, one ounce; hard soap, four drachms; mix the whole well together, and apply it to the part on flannels heated and moistened.---*Fourth Remedy.* (For cramp in the stomach). Drink copious draughts of hot water, brandy and water, ether, or laudanum; apply hot flannels moistened with compound camphor liniment and turpentine; bathe the feet in warm water, or apply mustard poultices to them. When the cause of cramp is constitutional, the best preventives are warm tonics, such as the essence of ginger and camomile, Jamaica ginger in powder, etc., avoiding fermented liquor and green vegetables, particularly for supper, and wearing flannel next the skin.

Corpulence.---Much sleep, much food, and little exercise are the common causes of persons growing fat. Excess of fat is an incumbrance which the body had better be without than with, and therefore it is a species of disease.---*First Remedy.* Gradually reduce the usual quantity of aliment, take less nutritious substances for food, drink sparingly, especially of malt liquors, use regular and daily active exercise, abstain from suppers, take short rest, sleep but few hours, and rise early every morning. By a rigid pursuance of these means for a due length of time, the most corpulent and unwieldy man or woman will be reduced within moderate bounds, with an acquisition of health, strength, and vigor.---*Second Remedy.* In addition to active exercise, the body should be rubbed with a pomatum made of lard three and a-quarter ounces, and camphor one ounce; this to be heated and mixed over the fire, and afterwards suffered to cool. Afterwards take five grains of aloes every four days, and employ the following clyster every morning; linseed, one ounce; rose leaves, one and a-half drachms; bay salt, three drachms; boil the ingredients for twenty minutes in a quart of water; just before taking the decoction off the fire, add to it camphorated oil one and a-half drachms.---*Third Remedy.* (Banting's System). This consists chiefly in discarding certain articles of food, and living as much as possible upon meat. The plan is scarcely calculated for general adoption, as it can only be followed by persons favorably circumstanced, whilst it exacts so much self-denial that, generally speaking, after being tried for a short time, it is given up.

Apoplexy.—A sudden suspension of the mental and physical powers.---*Remedy.* Remove the patient to a cool, well-ventilated room; place him in a reclining or sitting posture, with the head and shoulders slightly raised. Loosen all the tight parts of the sufferer's dress, especially anything pressing around the neck. Pour cold water over the head, and keep it cool by means of powdered ice in a bladder. Apply mustard plasters to the soles of the feet and the calves of the legs. If the patient be of a full habit, a dozen leeches may be applied behind the ears and on the temples. If food has been taken recently, an emetic of mustard and water may be given; and in order to promote the action of the bowels, a drop of croton-oil should be placed on the tongue, and repeated every two or three hours, till the end is accomplished. In persons of spare habit, a small quantity of stimulant, as wine or brandy, or a teaspoonful of sal-volatile in water, may be given every twenty minutes or half-hour. Bleeding should only be resorted to in the last extremity, where there is great danger, and the arrival of the med-

ical man is delayed. Persons of an apoplectic temperament should live moderately, eat plain and unstimulating food, and avoid wine, spirits, beer, etc. Exercise and fresh air are also of the highest importance.

NIGHTMARE.—The common causes of nightmare are indigestion and the use of narcotic and intoxicating substances.—*First Remedy.* Take of carbonate of soda ten grains; compound tincture of cardamoms, three drachms; simple syrup, one drachm; peppermint water, one ounce; mix for a draught, to be taken at bedtime.—*Second Remedy.* Subcarbonate of potass, twelve grains; peppermint water, one ounce; compound tincture of cardamoms, two drachms; syrup of ginger, one drachm; mix for a draught, to be taken at bedtime.—*Third Remedy.* Take, on going to bed, a teaspoonful of sal-volatile in a wine-glassful of cold water.—*Fourth Remedy.* Drink a couple of glasses of beer at supper, and with it mix a little carbonate of soda; also take the following: Rufus's pill, half a drachm; rhubarb, half a drachm; oil of cloves, ten drops; mix and form into twenty pills, two to be taken daily.—*Caution.* Persons subject to this visitation ought carefully to shun all kinds of food likely to prove flatulent or of difficult digestion. Hot and heavy suppers are particularly injurious, as are acids. Excess of sedentary employment should also be avoided.

NOSE, SUBSTANCES IN, TO EXTRACT.—The extraction of foreign bodies from the nose must be performed with great gentleness and care, otherwise, in attempting to get the substance out, it may be only further pushed in.—*First Remedy.* The extraction is best accomplished by means of the flat end of a probe or bodkin, bent about the eighth of an inch, nearly at right angles with the rest of the instrument, which bent end being carefully passed beyond the body, must be used as a hook to draw it out.—*Second Remedy.* If the foreign body be not very far in the nostril, it can sometimes be dislodged in the following manner:—Gradually close the free nostril by the pressure of the finger, and, at the same time, blow the nose forcibly, the combined effort causing the obstruction to be blown out.

NOSTRILS, ULCERATION OF.—The lining membrane of the nose is apt to become inflamed and ulcerated.—*Remedy.* Gently syringe the part with warm water, containing a little carbonate of soda in solution.—*Observe.* The nostrils do not communicate with the brain, as is popularly supposed. There is, consequently, no danger in adopting the above remedy.

LIME IN THE EYE.—Lime will sometimes intrude itself into the eye, and the accident is attended with much pain and even danger to the eyesight. It burns the coats of the eye, and may either destroy its transparency, or occasion such injury as to cause the eye to burst, shrivel up, and become utterly useless.—*Remedy.* Without an instant's loss of time, wet the web of a feather with warm vinegar and water, and with it remove the lime; at the same time apply the vinegar and water freely to the eyeball itself, and the inside of the lids, with a bit of soft muslin, or by gently syringing. When the lime is got rid of as completely as possible, the eye should be bathed with warm water, and afterwards a little sweet-oil dropped in, which will soothe it greatly.—*Second Remedy.* If the inflammation be considerable, a few leeches should be applied, and the part fomented with warm poppy-water. A smart purge must also be given.

ANKLE, SPRAINED.—*First Remedy.* Keep the ankle in perfect rest in bed or on a sofa. Apply warm moist flannels repeatedly for some hours, and a bread-and-water poultice on going to bed. Continue the treatment for some days, and if the pain be persistent and severe, apply leeches. Vinegar plasters had better not be used till all tenderness has subsided, and there remains only a slight pain and stiffness in the part; then a vinegar plaster is an excellent application, as it diverts the inflammation going on in the ligaments, by bringing out a crop of pimples on the skin, at a time when the pressure can be borne. When the pain has entirely ceased, the foot should be used cautiously; short and gentle walks only should be ventured on, to be extended and increased proportionally with the renewal of strength. For the swelling which often appears after a sprain, bind it

up with strips of soap plaster on a roller.—*Second Remedy.* Mix together a tablespoonful of honey, suet, and white of egg, beat the whole thoroughly together, and let it stand for an hour; then anoint the injured part with the oil resulting from the above mixture, keeping the ankle well bandaged. —*Third Remedy.* Apply cold lotion made of water, three parts; spirits of wine, one part; laudanum, one part. Support the ankle by a moderately tight bandage, and rest the limb; if the part become inflamed, withdraw the bandage, and instead of the solution, use warm water.

Adder-Bite.—*First Remedy.* Anoint the injured part frequently with sweet oil, and if the inflammation is excessive, apply a linseed poultice. Meanwhile, as the patient will in all probability exhibit great faintness, stimulants should be from time to time administered, such as brandy, sal-volatile and water, or even eau-de-cologne and water.—*Second Remedy.* Tie a tape or string above the part bitten, so as to prevent the poison ascending. The poison may be sucked out, but this hazardous experiment should be ventured on only by persons whose mouths and lips are free from any wound or excoriation. Apply, afterwards, a poultice of quicklime, with oil and honey. To allay itching, bathe the affected part with a solution of opium in water.

Bruises.—Bruises may proceed from many causes, be of many varieties, and occur in any part of the body. When severe, and happening over a joint, total rest of the limb must be enjoined, and the joint kept constantly soothed by fomenting it with a folded flannel, wrung out of a hot decoction of camomile flowers, and poppy heads, made strong. The same application may be applied to any other bruised part of the body, and where the pain is severe. When a swelling results from a bruise, not over a joint, wet a folded rag well with the extract of lead, and lay it over the part, repeating the process in a few minutes; with the third or fourth application the swelling will have disappeared. In the bruises and hurts received by children from falls, this will be found in all cases an invaluable remedy. When the skin has been broken by the bruise, and there is much discoloration and pain, apply the extract of lead, and over that, place a hot bran or camomile poultice, re-wetting the rag with the extract on every occasion of renewing the poultice.

Gnat-bite.—*First Remedy.* Mix equal portions of turpentine and sweet oil, and apply to the part.—*Second Remedy.* Wash the part with spirit of hartshorn.—*Third Remedy.* Acetate liquor of lead, half an ounce; cold water, half a pint; dissolve in half a drachm of opium, and mix together. Apply this to the part, to be followed a few hours afterwards by a little olive oil.

Chafing.—Children and fat persons are liable to have the skin chafed. —*First Remedy.* Bathe the part well with warm water, then dab it with fuller's earth and water, and, lastly, dust it with violet powder.—*Second Remedy.* Put a slug on the sore place, and after the slug has slimed the part, let it go. Instant relief will be afforded.

Nail, Ingrowing.—It often happens that a tight, or ill-made shoe, by continual pressure on one part of the nail, forces it into the flesh, and then causes great pain and inconvenience.—*Remedy for the Toe.* First procure an easier shoe, which will allow the nail to take its natural course; then take a piece of glass, and with it scrape the whole length of the middle of the nail persistently, and yet with a delicate hand. By this means, the centre of the nail will eventually be rendered so thin, that it may be readily bent, and in this flexible condition it gives way to the upward pressure of the skin on its outward edges, readily bends, and offers no further resistance. The cause of irritation being withdrawn, the tenderness soon heals, and the proud flesh drops down.—*Observe.* An ingrowing nail may be caused by an improper mode of cutting it. Nails should never be clipped at the corners, but cut straight across the top, if anything, slightly scooped in the middle. This leaves a sufficient amount of resistance at the corners; for wear what shoes we may, there must always be a certain de-

gree of pressure on the nail, which should be provided for.—*Remedy for the Finger.* Wrap the affected finger in a compress moistened with a lotion made as follows: Liquor of ammonia, one ounce; camphorated alcohol, one drachm; bay salt, quarter of an ounce; water, three-quarters of a pint; mix, and shake well together. After ten minutes, remove this, and replace it by a compress anointed with camphor pomatum, and kept in place till next dressing by an india-rubber finger-stall drawn over it. Then dissolve one and a quarter ounces of camphor in a gill of brandy, wet a narrow band with this solution, place it round the root of the nail, and let it remain there until the next dressing.—*Observe.* The finger-nails should be cut of an oval shape, corresponding with the form of the finger; they should not be allowed to grow too long, as they thereby are rendered more liable to accident, neither should they be too short, as they thus deprive the ends of the fingers of their protection and support. When the nails are naturally ragged or ill-formed, they should be gently scraped, afterwards rubbed with lemon, then rinsed with water, and well dried with a towel. If the nails grow more to one side than the other, they should be cut in such a manner as to make the points come as near as possible to the centre of the end of the finger.

Scalds.—In this accident the principle to act upon is, to keep up the heat of the part at first, and bring it down gradually to the ordinary temperature. The first, and most important object, is to protect the surface from the action of the air. For this purpose, flour, cotton-wool, or wadding, are the readiest means.—*First Remedy.* Flowers of zinc, calomine powder, and lycopodium, of each one ounce; powdered myrrh, and sugar of lead, of each half a drachm; lard, one and a half ounce; mix, and apply from time to time.—*Second Remedy.* Lime-water, one part; linseed oil, two parts; shake well together, and apply by lint or linen soaked in it. —*Third Remedy.* First apply vinegar until the pain abates, then a bread and milk poultice, and lastly, as soon as the watery fluid is seen to ooze out, cover the part with powdered chalk.—*Fourth Remedy* (for slight scalds). Apply oatmeal and cold water to the part affected immediately after the accident; keep it on as a poultice all night.—*Fifth Remedy.* Lime-water, six ounces; common spirits, three ounces; mix, and apply to the part by means of linen dipped in it.—*Sixth Remedy.* Goulard water and olive oil, of each, one ounce; rose water, four ounces; mix, and apply occasionally. —*Observe.* In all cases of scalds, if fever should ensue, general laxative medicines ought to be taken. The best are castor oil and Epsom salts.

Chapped Hands.—This troublesome complaint arises generally from not wiping the hands perfectly dry after washing them.—*First Remedy.* Borax, two scruples; glycerine, half ounce; water, seven and a half ounces; mix, and apply as a lotion twice a day.—*Second Remedy.* Honey, one ounce; borax, one drachm; mix, and apply as an ointment.—*Third Remedy.* Camphor, finely powdered, half-drachm; spermaceti ointment, one ounce; mix, and apply.—*Fourth Remedy.* Spermaceti, one ounce; white wax and olive oil, of each four ounces. Melt gently in a pot placed in boiling water, and add one ounce of honey and half an ounce of powdered camphor: stir the whole while cooling, and form the mass into balls, for occasional use.

Eruptions of the Skin.—Under this head may be included all rashes not especially treated elsewhere in this work.—*First Remedy.* As the main source of eruptions are derangements of the constitution and stomach, it must be borne in mind that local applications for restoring the healthy action of the skin, such as daily warm and cold sponging, warm baths, vapor baths, and well-regulated exercise, should be adopted, together with the following: Take of blue pill twenty grains; camphor, six grains; tartarized antimony, one grain; mix, and divide into sixteen pills, one or two to be taken every night for three or four nights successively; to be stopped for a like period, and then renewed. If the bowels do not act gently under the influence of these, a teaspoonful of Epsom salts and car

bonate of magnesia, mixed in equal proportion, may be taken each following morning.—*Second Remedy.* Lenitive electuary, two ounces; flowers of sulphur, half an ounce; mix well, and take a teaspoonful every night and morning.—*Third Remedy.* Apply to the eruptions the cerate of acetate of lead. When a stimulating application is desirable, weak citrine ointment may be made use of.

Bleeding from Wounds.—It is of importance to know how to proceed to stop the bleeding of a wound, as many serious and severe cases have occurred through the attendant or bystander not possessing the presence of mind or tact necessary in such an emergency.—*Remedy.* When a wound is situated in the limbs, and is succeeded by copious and protracted bleeding, the main thing is to prevent the whole current of blood passing through the limb. If from the upper part of the arm, the thumb should be pressed firmly into that part of the neck behind the collarbone; this will intercept the flow of blood through the principal artery of the arm as it issues from the chest. The thumb, however, is apt to become tired and relax its pressure, and nothing can answer the purpose better than the handle of a door-key wrapped in three or four folds of linen, which can be held in its position for an indefinite length of time. If the wound be high up on the leg or thigh, the thumb should be pressed immediately below the cavity of the groin, the patient, meanwhile, lying on his back. This will have the effect of arresting the flow of blood from the great artery which supplies the limbs. When the wound is situated below the middle of the upper arm, or below the middle of the thigh, a large and strong handkerchief should be bound once or twice round the limb; a piece of stick, such as a large skewer, or a small ruler, should then be introduced between the bandage and the skin, and twisted so that it screws the handkerchief tight until the flow of blood ceases. When the bleeding stops, the screwing should cease, otherwise the parts will be bruised and injured. If the wounded part be on a bone, the bleeding can be arrested by firmly pressing the finger on the bone, or by a cork, or a hard pad. It must be understood that these proceedings are to be adopted only until such time as proper assistance arrives. In every instance a surgeon ought to be sent for instantly.

Blood, Spitting of.—A discharge of blood, often of a frothy appearance, brought up with coughing, and preceded by a saltish taste in the mouth, difficulty of breathing, and a sense of weight and pain at the chest.—*First Remedy.* Avoidance of exertion, heat, and mental disturbance. The patient should be placed in a half-sitting posture. Cool air must be freely admitted, and if necessary, the head and body sprinkled with water. All stimulating food and drink must be discarded, and cold acidulated beverages should be given to drink. If this treatment does not arrest the spitting, give a little alum in water, and keep the bowels open with castor-oil or a dose of Epsom salts. When the spitting has ceased, every means should be adopted to prevent a return, and this is most effectually accomplished by the patient taking gentle carriage exercise, keeping himself quiet, and taking occasional doses of Peruvian Bark.—*Second Remedy.* Acetate of lead, twelve grains, made into a small mass with bread, and divided into six pills, of which one may be taken every three, four, or six hours, according to the urgency of the symptoms.

Blister.—The term blister is applied to any substance that has the power to raise the outer skin into bladders, or pustules. There are several varieties of blisters—animal, vegetable, and mineral, the principal being the cantharides or Spanish fly, mustard, euphorbium, mezereon, savin, antimony, silver, vinegar, potassa, and ammonia.

Blistering and counter irritation is a mode of treatment by which it is sought to cure one disease by establishing another of the same type, but less severe than the first; bearing this in mind, the general utility of all external stimulants, especially those of blisters, will be better understood and more fully appreciated.

Blisters are used in medicine as a means of depletion, either to carry off

from the body a certain amount of blood in the form of serum, and thus act as a local bleeding, or in addition to this effect, to cause, by the inflammation they produce on the surface, a larger amount of blood to circulate through the adjacent cuticle, and thus relieve some deeper organ or part from the excess of blood that disease causes to be attracted to it. With this view only, and when no depletion is required, medical men are in the habit of using a milder form of blistering than that effected by raising the epidermis in bladders, and to this they give the name of rubefacients, or, in simple English, substances that "make red."

From the benefit they afford, the case of application, and the safety of their employment, blisters have become of universal use, and may be considered as an established domestic remedy. Yet there are certain points in connection with them that require explaining, both for protection and guidance. When the blister has sufficiently risen, remove the plaster, and nipping the blister where it bags most, gently press out the water, taking great care not to break the skin as it collapses; immediately place over the whole a warm bread poultice, the bread confined within a fold of muslin, and allow it to remain for one or two hours; then carefully remove the poultice, and sprinkle the blistered part with a thick layer of violet powder, cover this with a piece of linen, and by a bandage or handkerchief keep the whole in its place; every four hours add more violet powder, especially over the moist part, taking care not to remove the cake or crust that forms till the cuticle is sufficiently healed to permit of its being taken away, when the place is to be lightly dusted with the powder from time to time, to avoid cracking the new cuticle. It is seldom, if ever, necessary to interpose gauze or tissue paper between the blister and the skin, and, except in very rare and singular cases, should never be done, nor is there any time that can be fixed as the duration a blister should remain on; this must depend on the rising, which will take from eight to sixteen hours to effect; though in infancy and childhood, from the extreme delicacy of the cuticle, the time required is infinitely shorter. But this is a point that every nurse provides for by frequent inspection. When a blister is not at hand steep a pewter plate or piece of flat metal in boiling water, and place it at once on the skin, pressing it down for a moment, and then allowing it to rise, and as it cools remove it; for in cases of still greater emergency, a blister may be obtained by wetting a part of the cuticle and rubbing on it for a few minutes, lunar caustic; or cut a circular hole out of a piece of adhesive plaster, which having adhered to the skin, tie some lint to the end of a stick, dip the padded end in nitric acid or aquafortis, and brush lightly and rapidly the skin exposed within the whole in the plaster, when a vesicle will be immediately produced. In this country it is seldom that any blister is used but that of cantharides or Spanish flies, except in extreme cases, that of mustard, as given above. The blister plaster as sold in the shops is a species of tough ointment, and is made of wax, suet, resin, and lard, all melted over a slow fire, and while cooling the powdered flies stirred in, till the whole, when cold, becomes a smooth, firm, and tenacious mass. The mode of making a blister is to cut out a shape from a piece of adhesive plaster, either round, ovil, oblong, or according to the part on which it has to be applied, and taking a piece of the blister plaster, and softening in the fingers with the right thumb wetted in water, extend it over the shape, leaving a margin of half an inch all round; the plaster is to be spread about the thickness of a shilling, and all over of an equal smoothness. This is then to be warmed for a moment before the fire, and applied evenly over the part, the edges of the plaster being nicked, where necessary, to make it lie flat. For the ears the shape of the blister resembles the figure 6, the O part coming under the lobe of the ear, and the tail sweeping behind it; each ear, however, requires a different position of the figure, that of the left needing the 6 as it naturally stands, the right must have it reversed, as thus, 9.

Black Eye.—This is an unfortunate disfigurement, which the world involuntarily associates with fighting and drunkenness; oftentimes the hurt

results from the purest accident; but few people will believe it, and the less said about it the better.—*Remedy.* Bathing the part frequently with warm water is the only remedy for a black eye, and in a few days the skin will resume its natural color and appearance. We may here mention that there are persons who publicly advertise to paint over black eyes, so that all traces of the injury may be hidden under an imitative flesh coloring.

Blear Eye.—A term given to an inflammatory appearance of the eyelids and the corners of the eye itself.—*First Remedy.* This minor complaint is often very obstinate, arising, as it does, from some hereditary taint and resolving itself into a constitutional defect. When resulting from age, cold, or temporary weakness, adopt the following:—Mix five grains of sulphate of zinc in two tablespoonfuls of water; wet the eye from time to time with a piece of linen rag or lint dipped in this liquid.—*Second Remedy.* Take an active aperient of calomel and rhubarb, and bathe the eye with poppy-water. If, on the subsiding of the inflammation, the eye feel weak, wash it frequently during the day with a lotion composed of a grain of sugar-of-lead to a large tablespoonful of soft water.

Bleeding at the Nose.—This is common with young persons, and with such as are of full habit of body. Generally speaking, it may be regarded as an effort by which Nature seeks to relieve the overcharged system, and when it does not occur too frequently, or last too long, it is as well to allow the bleeding to go on unchecked. With weak or aged persons, however, it cannot be stopped too soon.—*First Remedy.* The sudden application of cold, by driving the blood from the surface, effects a stoppage in ordinary cases. Putting a door-key down the back, bathing the head and face with cold water, or vinegar and water, exposing the body to the cool air, and drinking iced lemonade, are among these expedients.—*Second Remedy.* If the bleeding is difficult to check, place the person in an upright position, put a moderate pinch of powdered alum into two tablespoonfuls of water, and with a syringe inject this up the nostrils.—*Third Remedy.* If the above should fail, a plug of lint should be made, with a strong thread or piece of twine tied round it, then moistened with water, and dipped in finely-powdered charcoal. The coagulated blood should not be removed from the nostrils, but suffered to come away of its own accord, which it will shortly. Where there is a frequent recurrence of bleeding at the nose, it is advisable to keep the system cool, and the bowels somewhat relaxed; a seidlitz powder two or three times a week, the first thing in the morning, will effect this.

Abrasion.—A wound of the skin caused by friction.—*First Remedy.* Remove any sand or dirt from the part by bathing it in warm water; then apply spirit and water to it till the pain is somewhat abated, lay a piece of dry lint over it, or lint wetted with water, and over that a piece of oiled silk to retain the moisture. If there is much pain or swelling from inflammation, apply a bread-and-water poultice, or a piece of linen moistened with Goulard water. When this comes off, if the skin is not healed, dress with simple cerate, spermaceti, &c. *Observe*, common sticking-plaster irritates abrasions, court-plaster does not.—*Second Remedy.* After having washed the wounded part with warm water, apply collodion by means of a hair pencil; a piece of gold-beater's skin first, and the collodion applied afterwards.—*Third Remedy.* Take tincture of arnica or wolf's-bane, dilute it with twenty parts of water, or thirty parts, where the skin is broken; apply the liquid with linen rag wrapped round the injured part. If the mixture should prove too strong, dilute it with more water.

Drowning.—The restoring of apparently drowned persons depends greatly on the prompt application of remedies and the presence of mind of the operator.—*Remedy.* On the first alarm of a person being drowned, send quickly for medical assistance, and while the body is being searched for, or conveyed to the nearest house, the following articles should be got ready:—Warm water, a warming-pan, hot blankets and flannels, heated bricks, a pair of bellows, sal-volatile, smelling-salts, clyster-pipes, and an electrifying machine. When the body is found, it should be quickly conveyed to a warm

and dry situation, and rubbed all over with moderate stimulants, as diluted flower of mustard, then wrapped in hot blankets, and placed in a warm bed. Apply sal-volatile, or smelling-salts, to the nostrils, and let the eyes be exposed to a strong light. But restoration of the action of the lungs is chiefly to be aimed at; and for this purpose, a full expiration of warm air from the mouth of a bystander should be repeatedly forced into the patient's mouth, at the same time drawing downwards, and pushing gently backwards, the upper part of the windpipe, to allow a free admission of air; blow the bellows gently in order to inflate the lungs, till the breast be a little raised; the mouth and nostrils may then be set free, and a moderate pressure made with the hand upon the chest. Injections of camphor, ammonia, and brandy have often been introduced with success into the rectum, and sometimes injections of warm air alone. Besides this process, it may be possible to convey some warm and active stimulant, as ammonia, or the compound spirit of lavender, into the stomach by means of a syringe. Bladders, or bottles of hot water, or heated bricks, should be applied to the pit of the stomach, the arm-pits, between the thighs, and the soles of the feet. Returning life is first usually discoverable by the symptoms of sighing, gasping, slight palpitation or pulsation of the heart; the efforts to restore life should then be redoubled, for the feeble spark still requires to be solicited and nourished into a flame, and it has often gone out from a relaxation of labor. A spoonful or two of warm wine, or warm wine and water, should now be introduced into the mouth, so soon as the power of swallowing is sufficiently restored, which should be shortly succeeded by a light, warm, and nourishing food of any kind, with gentle laxative clysters, a well-heated bed and perfect tranquillity.

Piles.—These consist of small tumors, situated on the extremity of the great gut, called the rectum. The piles are usually accompanied by a sense of weight in the back, loins, and bottom of the belly, together with pain in the head, sickness at the stomach, and flatulence in the bowels. If the tumor breaks, a quantity of blood is voided, and considerable relief from pain is obtained; but if they continue unbroken, the patient experiences great pain.—*First Remedy.* Take of lenitive electuary one ounce; flour of sulphur, one ounce; jalap, in powder, one drachm; balsam of copaiba, half-ounce; ginger, in powder, half-drachm; cream of tartar, half-ounce; syrup of ginger, a sufficient quantity to form the whole into an electuary; mix. Take a teaspoonful every three hours, until the bowels are freely open, at the same time, make use of the following lotion: Goulard water, six ounces; laudanum, one ounce; mix, and apply to the parts repeatedly.—*Second Remedy.* When the piles are very painful and swollen, but discharge nothing, the patient should sit over the steam of hot water. He may also apply a linen cloth, dipped in warm spirits of wine, to the upper part, or make use of bread and milk poultices.—*Third Remedy.* Take of powder of oak-galls, one ounce; elder ointment, one ounce; mix, and anoint the parts night and morning.—*Fourth Remedy.* Sublimed sulphur, half ounce; cream of tartar, one and a half drachms; lenitive electuary, one ounce; syrup sufficient to form an electuary. A teaspoonful to be taken at bed-time.—*Fifth Remedy.* Powdered nut-gall, two drachms; camphor, one drachm; melted wax, one ounce; tincture of opium, two drachms; mix, and apply as ointment to the parts.

To Apply an Eye Stone.—Eye-stones are frequently used to extract matter, railroad sparks, and other extraneous substances from the eye. They are to be procured from the apothecary's. They cost but two or three cents apiece, and it is well to get several, that if one does not succeed, you may try another. To give an eye-stone activity, lay it for about five minutes in a saucer of vinegar and water, and if it be a good one, it will soon begin to move or swim round in the liquid. Then wipe it dry, and let it be inserted under the eyelid, binding the eye closely with a handkerchief. The eye-stone will make the circuit of the eye, and take out the mote, which, when the eye-stone finally drops out, it will bring with it.

The first thing to be done, when a mote or spark gets into your eye, is

to pull down the lower part of the eyelid, and with a handkerchief in your hand blow your nose violently at the same moment. This will frequently expel the mote without further trouble. A mote will, in many cases, come out of itself, by immediately holding your eye wide open in a cup or glass filled to the brim with clear cold water. Or take a small pin, and wrapping the head in the corner of a soft, cambric handkerchief, sweep carefully round the eye with it, under the lid, above and below. This should be done with a firm and steady hand. Another way is to take a bristle from a brush, and first tying the ends together with a bit of thread, so as to form a loop, sweep round the eye with it, so that the loop may catch the mote and bring it out. A particle of iron or steel has, we know, been extracted from the eye by holding near it a powerful magnet.

Chilblains.—A species of inflammation which arises from exposure to a severe degree of cold. For Unbroken Chilblains: *First Remedy.* Solution of acetate of lead and camphorated spirits, of each equal parts; mix, and apply twice a day with a hair pencil.—*Second Remedy.* Soap liniment, one ounce; cajeput oil, quarter of an ounce; tincture of cantharides, quarter of an ounce; mix.—*Third Remedy.* Oil of turpentine, one ounce; camphor, quarter of an ounce; Goulard water, quarter of an ounce; mix.—*Fourth Remedy.* (Dr. Graves's Preventive). Sulphate of copper, ten grains; water, one ounce; dissolve, and brush over the parts by means of a camel-hair pencil, and when dry, apply a little simple ointment; repeat this for some evenings in succession.—*Fifth Remedy* (Le Jeune's Balsam). Camphor, one and a-half drachms; tincture of benzoin, one ounce; iodide of potassium, three drachms; extract of lead, two ounces; a mixture of equal parts rectified spirits of rose water, four ounces; mix the above with a solution of two ounces of soap in four ounces of the same diluted spirit; mix the whole, adding a few drops of any essential oil.—*Sixth Remedy* (Swediaur's Paste). Bitter almonds, eight ounces; honey, six ounces; powdered camphor, half an ounce; flour of mustard, half an ounce; burnt alum, quarter of an ounce; olibanum, quarter of an ounce; yolks of three eggs, beat together to form a paste; rub a portion of it on the part affected, moistened with water, night and morning; then wash with warm water, and dry with a cloth.—For Broken Chilblains.—*First Remedy.* Apply a bread and water or linseed-meal poultice, for three or four days in succession, and afterwards dress the sore surface with resin ointment thinly spread on lint, or with an ointment made of equal parts of the ointment of nitrate of mercury and white cerate, applied in the same manner.—*Second Remedy.* Black oxide of iron, bole, and turpentine, of each one drachm; rub together, and add to the mixture one ounce of resin cerate.—*Third Remedy.* Locatelli balsam, one ounce; citrine ointment, quarter of an ounce; balsam of Peru, twenty drops.—*Fourth Remedy* (As used in Russia). Dry the peelings of cucumbers, and when required for use, soften the inner part with water, and apply it to the part affected.—*Fifth Remedy.* Lunar caustic, five grains; red precipitate, one drachm; basilicon, one ounce; water, one ounce. As the sores advance towards healing, these preparations should be made proportionally weaker.

Breast Pang.—A sudden and acute pain about the breast-bone, extending towards the arms, attended with difficulty of breathing and a sense of suffocation.—*Remedy.* This pain is most likely to come on while walking, or directly after eating; but sometimes it makes itself felt in sleep soon after midnight. Instant relief is required during the attack, and the first stimulant that comes to hand may be administered; a dose of strong spirits and water, or a teaspoonful of sal-volatile or ether in water, and repeated at intervals. If the pain continue, frictions and mustard plasters applied to the chest, soles of the feet, and calves of the legs. Where there is extreme faintness, the horizontal posture should be adopted. Persons subject to these attacks would do well to provide themselves with the following, as a medicine in case of need:—Half an ounce each of sulphuric ether, spirits of ammonia, and sal-volatile; two drachms of tincture of opium. Mix and take a teaspoonful in water, and repeat at the end of an hour if relief be not afforded.

Cuts.—For small and simple cuts, the following : *First Remedy* Tie it up at once with a piece of linen rag ; this is usually sufficient to stay the bleeding ; the small quantity of blood which may exude quickly dries upon the wound, and forms a sort of glue which effectually excludes the air. As no better dressing can be used, it may be left on till the cut is well.—*Second Remedy.* If the bleeding should be excessive, it should be checked by the use of cold water or astringents, such as turpentine or Friar's balsam, and the edges of the cut surface brought firmly into contact by strips of sticking-plaster, and, if necessary, bandaged.

Deafness.—The most frequent cause of this disorder is cold, causing a lodgment of hardened wax in the outer passage of the ear.—*First Remedy.* Drop into the ear every night a small portion of salad oil, and syringe the ear daily with warm water till the wax is detached and washed out ; then apply a little wool or cotton, moistened with the following liniment, camphorated oil, half an ounce ; soap-liniment, half-drachm ; mix. Continue this for some weeks. *Second Remedy.* Oil of almonds, one pound ; bruised garlic, two ounces ; alkanet, half an ounce ; infuse and strain, to be applied with a little cotton to the ear. *Third Remedy.* Fill the mouth with the smoke of the most powerful tobacco, then close the mouth and hold the nostrils tight. A strong effort should then be made to drive the smoke out at the nostrils, and this exertion will force the smoke through the Eustachian tube of the ear. If a crack be felt in the ear, the deafness will in all probability be removed. This remedy chiefly applies to deafness of some standing ; in such cases it has been frequently employed with success.

Delirium Tremens. Trembling delirium, or the drunkard's palsy, is a disease in which the mucous membrane of the stomach and bowels, as well as the lining membranes of the brain, are in a state of chronic inflammation, resulting almost always from intemperate habits and excessive indulgence in ardent spirits. This disease is manifested by a total want of sleep, and a quivering of the lips, hands, and muscles generally ; every attempt at speech or motion increasing the tremor, rambling, and constant chattering ; the skin is cold and moist, the pulse small and quick, and the tongue furred in its centre, with red edges, the countenance is anxious, the patient full of suspicion, and oppressed with dreams and frightful images.

Treatment. The first step to be taken is to tranquillize the system, which may be effected by giving one grain of opium as a pill every four hours, with two tablespoonfuls of the following mixture every one or two hours.

Camphor water.	5½ ounces.
Brandy.	2 ounces.
Ether	1 drachm.
Spirits of sal-volatile.	1½ drachm.

Mix. In addition to the mixture and pills, it is sometimes necessary to give brandy and water, wine, or pure spirit. When the trembling is subdued, and the system tranquillized, the following mixture is to be given in the same dose and quantity as the former, but discontinuing the pills.

Infusion of roses leaves.	8 ounces.
Epsom salts.	½ ounce.
Syrup of red poppy.	2 drachms.
Diluted sulphuric acid.	20 drops.
Tincture of opium.	1½ drachms.

Mix. When there is much congestion of the head, it will be necessary to apply a few leeches to the temples, but as a general rule, all depletion is injurious. During the whole attack, the patient is to be steadily watched, kept quiet, and as far as possible, amused and interested.

Dislocations. These accidents are shown by the alteration in the form of the joint, one part being unusually prominent, and the other part unnaturally depressed. Dislocation of the Jaw. This often occurs through yawning or excessive laughter, and leaves the patient in that awkward predicament that he can neither close his mouth nor open it wider. *Remedy.* Wrap a handkerchief round each thumb, insert them in the inner angles of

the jaw; a firm but gentle pressure being thus applied, the jaw will be soon restored to its proper position. Dislocation of the Arm. *Remedy.* Pass a sheet or jack-towel over the chest, and thence secure it to a bed-post or some fixed point; the patient should then gradually extend the arm till the head of the bone passes the socket, when by relaxing the strain, it will glide into its place with a snap; meanwhile a person should firmly grasp the shoulder-blade to prevent its moving. For some four or five days afterwards, the limb should be kept perfectly still; and if much swelling supervenes, apply a few leeches or a cold lotion made as follows: Sugar of lead, one ounce; water, one quart; vinegar, one gill; mix, and apply to the swollen part as long as necessary. Dislocation of the Shoulder. *First Remedy.* The sufferer and another person should lie on their backs in such a way that the feet of one are at the shoulder of the other A folded towel is then put in the patient's armpit, and the operator places his foot (without his boot) on this, grasps the patient's hand, and pulls the arm down steadily. At the same moment the patient slightly alters his position, and in doing this, calls into play other muscles, and thereby favors the success of the operation; the operator then pulls a little more vigorously, and the bone returns to its place. *Second Remedy.* When this accident occurs to a person out of doors he may reduce the dislocation himself. All he has to do is to get his arm over the top rail of a five barred gate, and then having grasped the lowest rail he can reach, hold fast, and let the whole weight of his body hang on the other side of the gate; then if he make some attempt to change the position of his body, still letting its weight tell on the top of the gate, the bone will in all probability slip into its place. Dislocation of the Hip Joint. *Remedy.* The patient and the operator lie on their backs; two other persons holding the patient's hips steady to prevent their swaying about. A folded towel is then placed between the patient's legs; the operator puts his foot on this, firmly pressing it against the "fork"; he then grasps the patient's ankle with both his hands, and bidding the patient change his position a little, pulls; the bone is thus replaced. *Observe.* As the contractile power of the muscles is very great, it is advisable, in order to render them more flexible, to administer, previous to the operation, an emetic. If the patient, however, is sickly and delicate, this had better not be done.

Hysterics. This complaint is confined chiefly to females. *First Remedy.* A fit of hysterics is generally the result of some natural and immediate cause, and until this is discovered and removed, the patient will always be subject to these fits. When a person is seized with the fit the dress should be loosened, fresh air admitted, cold water dashed in the face, and salts, or singed feathers, applied to the nostrils. If consciousness does not then return, a draught of sal-volatile and water should be given, and if the patient be still insensible, the temples and the nape of the neck should be rubbed with brandy. When hysterics can be traced to impaired natural action, equal portions of pennyroyal and wormwood should be steeped in boiling water, and suffered to simmer by the fire until the virtue of the herbs is extracted. It should then be allowed to cool, and half a pint be taken twice or thrice a day, succeeded on each occasion by a compound assafœtida pill, until the desired relief is afforded. *Second Remedy* (Sir A. Carlisle's). Hold a piece of polished steel in boiling water for a minute or two; then pass it down the back of the patient over a silk handkerchief. This has been known to entirely free persons from attacks of hysterics who had previously been periodically subject to them.

Indigestion. This one of the most common ailments to which mankind are subject, there being few individuals who have not experienced it oftener than once in their lives. Accidental fits of indigestion are of frequent occurence, and arise for the most part from overloading the stomach with food, and indulging too freely in wine, spirits, or other intoxicating liquors. Confirmed or chronic indigestion may depend on debility or want of tone of the stomach, or it may be caused by the lining or mucous membrane of this

organ being in a state of irritation or chronic inflammation. One of the most frequent causes of indigestion is not masticating the food we eat properly, by which such food is bolted instead of being reduced to a natural pulp, thereby presenting to the digestive organs a hardened mass, which it has the greatest difficulty to operate upon. Another cause is habitual inattention to diet, both as regards the quality and quantity of food, irregularity in the times of eating, drinking large quantities of warm relaxing fluids, and using malt liquors too freely. A third cause is insufficient exercise; a fourth cause, impure air; and besides these, there are numberless other causes which in a greater or less degree, exercise their baneful influence upon this vital and all-important function of our natures. Before we proceed to give the remedies applicable to this disorder, we will lay before our readers what is of equal consequence, both as regards prevention and cure—namely, *Diet and Regimen:*—Rise early; sponge the body freely with cold water; breakfast without taking previous exercise, except a saunter in the garden. At breakfast, drink no more than half a pint of tea, neither too strong nor too weak, and black tea in preference to any other. Eat a slice or two of stale bread, together with a thin rasher of streaky bacon. After a short rest, exercise should then be taken for two hours or upwards. The dinner hour should be not later than four or five hours after breakfast, and the best time in the day for this meal is one or two o'clock. The food should be plain, without sauces. Roast mutton is the best of all meats, both as regards its nourishing properties and the ease with which it can be digested. For drink, toast and water, bitter ale, or a little brandy and water, weak, are preferable. After dinner, rest and quiet for an hour are desirable. About three or four hours after dinner, a cup of tea with a biscuit. Supper at nine on light food, with a draught of ale or wine and water. To bed between ten and eleven o'clock. This mode of living will generally render a person exempt from habitual indigestion; nevertheless, in spite of these precautions, occasional attacks of this derangement will make themselves felt.—*First Remedy.* Bay berries, six drachms; grains of paradise, two drachms; socotrine aloes, and filings of iron, of each two scruples; oil of turpentine, two drachms; simple syrup, sufficient for an electuary: take a piece the size of a nutmeg night and morning. *Second Remedy.* Rhubarb, fifteen grains: sulphate of potass, thirty grains; tincture of senna, half a drachm; peppermint water, one and a half ounces; mix, and take twice a week until relief is afforded. *Third Remedy.* Columba root, in powder, eight grains; rhubarb, ten grains; ginger, two grains; ipecacuanha, three grains; carbonate of potass, five grains; dill-water, one ounce and a-half; mix for a draught, and take twice a-day on an empty stomach. *Fourth Remedy.* Infusion of gentian, twelve drachms; Epsom salts, three drachms; tincture of cascarilla, one drachm; tincture of orange-peel, one drachm; mix for a draught, which may be taken in the morning on rising, and repeated in six hours. *Fifth Remedy.* Quicklime, half an ounce, slaked with a little water; add one pint and a half of water; bruised cinchona bark, one ounce; cover and macerate for three hours, occasionally stirring them; decant the clear liquor, and add to it tincture of bark, two ounces; nitric ether, three drachms; syrup of orange-peel, one ounce; mix, and keep closely corked. Dose: one wineglassful.

Ear-Ache.—Some persons, especially children, are much troubled with this complaint on taking cold. It depends on natural irritability of the interior of the ear, and sometimes the stomach and constitution are out of order. *First Remedy:* A dose or two of aperient medicine, and a piece of wool, moistened with sweet oil, worn in the ear. *Second Remedy:* Foment the ear with hops or poppyheads steeped in hot water. *Third Remedy:* Roast an onion, and place the kernel of it in the ear, warm. *Fourth Remedy:* Apply a linseed poultice or a mustard plaster to the back of the ear, and take the following: Magnesia, one drachm; rhubarb, half a drachm; powdered ginger, ten grains, mix, and divide into three doses; mix each dose with a little water, take one instantly, and the others till relief be

afforded. *Fifth Remedy:* Moisten a piece of wool with two drops of laudanum, one drop of oil of cloves, and a little oil of almonds, and place it in the ear.

Ear, Abscess in.—*First Remedy:* Apply bread poultices to the ear, and warm fomentations; syringe the ear with warm milk and water. When the abscess has broken and discharged freely, the ear must be kept very clean, and a syringeful of a slightly astringent lotion, such as ten grains of sulphate of zinc to a quarter of a pint of rose water, be injected lukewarm twice a day. *Second Remedy:* When there is much discharge, injections of warm soap and water, blisters behind the ear, or a drop or two of the following mixture put into the ear will be found beneficial: ox-gall, three drachms; balsam of Peru, one drachm; mix. *Third Remedy:* A few grains of musk introduced into the ear with cotton wool, may be employed with success in diminishing the discharge.

Ear, Noises in.—These unpleasant sensations in the ear, if of long standing, are symptoms of an accumulation of wax, or of a determination of blood to the head. If occasional, they probably arise from indigestion, and will be removed as soon as digestion resumes its wonted functions. The best plan is to obtain medical advice, so that it may be ascertained beyond a doubt from what cause these noises proceed.

Ear, Hardened Wax in.—Sometimes from neglect, and sometimes from natural defect, the wax of the ear forms into a hardened mass. The air from without forces its way between this and the wind-passage of the ear, and causes that buzzing, roaring, singing, and tingling noise, which is very distressing. These noises are occasionally attended with pain and inflammation. *Remedy:* Syringe the ear night and morning with warm water, taking care that it is warm only. At night, after syringing, fill the ear with a bread and milk poultice, and repeat this until the wax comes away, which it generally will after three or four applications. When the ear-tube has been cleaned and dressed with some soft linen, a small quantity of warm oil should be dropped into it, with a small piece of wool laid against, but not pushed into the ear-tube. When persons are affected with this complaint, they should not, as is too commonly the practice, thrust their nail into the ear, or otherwise irritate it, with a view of obtaining relief. The wax, in order to be dislodged, must be first of all softened; it is useless to endeavor to extract it in its hardened state.

Ears, Things in.—It frequently happens that children, in playing, push things into their ears. *Remedy:* In such cases, the common practice of thrusting in a bodkin or other probe, with a view of extracting the foreign substance, is very pernicious, and should never be attempted. If it is a pea that has found its way into the ear, the ear should not be syringed with water or any other fluid, as it causes the pea to swell, and increases the mischief rather than remedies it. Hot linseed poultices, frequently applied, are better. If, however, the substance be a button, bead, shell, or other hard body, the employment of the syringe may be beneficial; the water probably will pass between the hard body and the drum of the ear, and so force the substance out. To accomplish this operation successfully, the head should be rested on the table with the affected ear undermost; in this position the water should be injected, the nozzle of the syringe being held at some little distance, and not put into the pipe of the ear, as it will prevent the hard body dropping out. If this should fail, a smart blow on the upper side of the face will sometimes expel the intruder. We need scarcely remind our readers that in this and similar accidents the very best plan is to have proper surgical treatment. It is only where such assistance is difficult or impossible to be obtained, that these delicate operations are to be performed.

Eye, Inflammation of.—This disease comes on with pain, heat, and redness of the eyeball, with a hot discharge of tears from the eye; with the pain there is a sensation as though sand were in the eye. *First Remedy:* Take a strong purgative, and soon after the operation of it, drop into the eye from a clean quill pen a drop of the following: sulphate of zinc, four grains; water, two ounces; mix, and repeat the application five or six

times a day. *Second Remedy:* Bathe the eye with a fomentation of camomile flowers. *Third Remedy:* Acetate of lead, twelve grains; distilled vinegar, two drachms; filtered rain water, eight ounces; mix, and bathe the eye with it four or five times a day. *Fourth Remedy:* Syringe the eyeball with a weak solution of alum (two grains to one ounce), or vinegar and water; at night smear the edges of the eyelids with a small portion of citrine ointment.

Eye, Substances in.—When a foreign substance lodges on the surface of the eye, the necessary consequence is pain and acute inflammation; if neglected, obscurity of vision, and even loss of sight, may result. *Remedy:* If the substance be disengaged on the surface of the eye, it may be easily removed by means of a camel-hair pencil dipped in oil, or by a piece of soft paper rolled into the size of a quill moistened in the mouth. When the substance is fixed on the coats of the eye, a surgeon must be consulted.

Eyes, Weakness of.—*First Remedy:* Sulphate of copper, fifteen grains camphor, four grains; boiling water, four ounces; mix, strain, and when cold, make up to four pints with water; bathe the eye night and morning with a portion of the mixture. *Second Remedy:* Spirit of mindererus, one ounce; rose water, seven ounces; mix, and use occasionally. *Third Remedy:* White vitriol, ten grains; elder-flower water, eight ounces; mix, and apply as occasion may demand.

Eyelids, Sore.—Redness of the edge. *Remedy:* Rub into the roots of the eyelashes, with the eyes gently closed, every night, an ointment of nitric oxide of mercury. Roughness of the inside of the lid. *Remedy:* Rub gently on the inside of the lid a smooth piece of the sulphate of copper, taking care to keep the eyelids open until the solution caused by the tears is washed off from the eye itself by using a syringe with tepid water. The application may be repeated as soon as the increased redness of the white of the eye has disappeared. When the hairs grow inwards, and irritate the eye, they may be removed one by one with a pair of fine forceps; or where there are fears of this delicate operation not being skilfully performed, a little collodion may be brushed over the lid, and in drying it will contract the skin, and thus for a few hours replace the hairs. This process must be repeated every day until the evil is removed.

Face-Ache.—*First Remedy:* Dip a sponge or piece of flannel into boiling water, and apply it as hot as can be borne over the site of the pain. *Second Remedy:* Soak a piece of lint in chloroform, and apply it over the affected part. *Third Remedy:* Rub in laudanum.

Feet, Offensive.—The unpleasant smell which the feet of some persons give out is generally attributable to some defect in the pores of the skin. *Remedy:* Wash the feet in warm water, to which a little hydrochloric acid, or chloride of lime, has been added.

Feet, Swollen.—Usually a sign of debility. *Remedy:* Put on a bandage moderately tight, from the toe upwards, giving a uniform degree of pressure; take also the following medicine: Squill pill and extract of colocynth, of each half a drachm; calomel, one scruple; digitalis, ten grains; mix, and make into twenty pills. Take two every day.

Fingers, Jammed.—This accident frequently occurs through the shutting of a door or drawer. If the end only of the finger be nipped, the nail very soon blackens, in consequence of the blood breaking from the small vessels, and being pent up beneath the unyielding nail. *Remedy:* The most speedy mode of procuring relief after the occurrence of the accident, is to plunge the finger into water as hot as it can be borne. By so doing the nail is softened, and yields so as to accommodate itself to the blood poured out beneath it, and the pain is soon diminished; the finger may then be wrapped in a bread and water poultice. On the following, or on the third day, the blood has clotted, and separating into its clots and fluid parts, the pressure it makes upon the sensible skin under the nail may be relieved by scraping the nail with a penknife or piece of glass, until it becomes so thin that the scraping causes a sharp pain from its nearness to the sensible skin; the remaining thin nail then bulges, and the pain is thereby mitigated. But if

the injured part of the nail be very black, and if it be very tender when touched, then it is best, after scraping, to make carefully, with a penknife, a very small nick through the still remaining nail over the black blood, and immediately it is cut through, the watery part of the blood oozes out, the pressure almost entirely ceases, and instantaneous relief follows, but it rarely prevents the nail being thrown off. If all the parts of the end of the finger be injured, nearly the same results follow as from an aggravated whitlow, and the whole bone, as well as soft parts, may mortify and be thrown off.

Finger, Broken.—A piece of stiff wood or pasteboard, as wide and as long as the finger is, to be applied on the same side as the palm of the hand, and the finger laid straight, and bound upon it with a roller an inch wide. The hand should be kept in a sling for three weeks or a month, and no attempt made to use it till after that time. The broken finger remains stiff long after the bone has become well united. It is a good plan, in order to render the joints supple, to immerse the hand for half an hour daily in warm grains or warm water, and afterwards gently bend the fingers backwards and forwards as far as they can be moved without pain.

Fits, Suffocating or Strangling.—These fits depend generally on a spasm or contraction of the nerves in the vesicles of the lungs. *Remedy:* Apply the vapor of heated vinegar to the nostrils; let the patient drink freely of whey, and take the following: Oxymel of squills, one ounce; barley water, six ounces; cream of tartar, half a drachm; mix; dose, a wineglassful every half hour.

To Counteract the Effect of Poisons. There are four kinds of poisons: Mineral, animal, vegetable, and aërial. The mineral poisons corrode the flesh, and produce inflammation. The vegetable generally stupefy, and leave no marks of inflammation. The animal generally affect the whole body; and the aërial, the respiratory organs.

Mineral Poisons.—*Remedy.* First empty the stomach by giving the following emetic: sulphate of zinc, twenty grains; powdered ipecacuanha, ten grains; mixed in milk. When this has operated, give plenty of barley water, milk, a solution of gum-arabic, broth, or olive oil; mix wood-ashes with boiling water; allow them to settle, and give the lees; or powdered charcoal may be given. For arsenic, lime-water, chalk and magnesia are recommended. For nitrate of silver, common salt—a tablespoonful in a quart of water; half a pint for a dose.

Animal Poisons.—*Remedy.* The parts bitten by a venomous animal should, if possible, be immediately cut out, then immersed in warm water; after which, some caustic application—such as nitrate of silver—should be made to the entire surface of the wounded part. Brandy, ammonia, and other stimulants, with opiates, should be given. In bites from snakes, the use of ligatures above the bitten part should on no account be neglected.

Vegetable Poisons.—*Remedy.* The chief of these poisons are opium, hemlock, digitalis, belladonna, laurel, and various kinds of fungi. In every case give an emetic immediately. Sometimes the stomach is so torpid, that vomiting cannot be produced. In such cases, dashing cold water over the head will frequently rouse the patient and bring on vomiting. In all cases where laudanum or opium has been taken, the patient must be kept constantly roused, and made to walk about between two men, or driven with speed over very rough roads in a cart; on no account must he be allowed to fall asleep. Oxalic-acid is often taken in mistake for salts; it acts with fearful rapidity, and the remedies must be immediate to prove effectual. The chief antidotes are magnesia, chalk, or mortar or plaster taken from a wall, mixed thick in cold water, and swallowed copiously. After giving any of these antidotes, twenty-four grains of sulphate of zinc may be taken.

Aerial Poisons.—*Remedy.* The fumes of metals generally produce these The fumes of charcoal and coke are also poisonous. Immediately on discovering a person who has been suffocated by these fumes, take him into the open air and undress him, so that the air may get to every part of his body; place him in a leaning posture on a chair; after a little time, cover him

with flannel, sprinkle the face with vinegar and water, the stomach with cold water, and place the legs in a cold bath. After some time, well rub the body, apply sal-volatile to the nostrils, put him in a warm bed, and keep him quiet. When he is able to swallow, give him a little vinegar and water.

Printer's Disease.—By having the eyes continually fixed upon the black types, the tone of the membranes and fibres of the eye—and especially of the pupil—becomes greatly weakened.—*Remedy.* Compositors ought to wear spectacles, in order to preserve the tone of the eye; to turn their sight frequently off the types, and gently rub their eyes, in order to rouse their languid spirits, and to wet them with the following eye-water: sulphate of zinc, one drachm; cold water, one pint; mix.

Scurvy.—A disease depending on deterioration of the blood, and generally the result of inappropriate nourishment. It commences with languor and signs of general debility, and great depression of spirits; the gums become swollen and spongy, red or purple looking, project over the teeth, and bleed easily. The lower extremities become at first stiff, then swollen and hard.—*First Remedy:* As the deprivation of fresh vegetables and milk is frequently the cause of this complaint, so, a return to these will overcome the disease; and this of itself is oftentimes a remedy.—*Second Remedy:* Dissolve two ounces of nitre in one quart of vinegar; take half an ounce of this solution two or three times a day.—*Third Remedy:* Wash the mouth and gums frequently with the following gargle: Compound infusion of roses, six ounces; alum, one and a half drachms; honey two drachms; mix.—*Fourth Remedy:* Decoction of Peruvian bark, six ounces; tincture of myrrh, one and a half ounces; muriatic acid, fifteen drops; mix for a gargle, and use frequently.

Sea-Sickness.—This depends upon the peculiar state of the brain, apparently caused by a want of the usual firmness and steadiness of the equilibrium of the body.—*First Remedy* (preventive). Persons about to proceed to sea should put their stomach and bowels in order by the use of mild aperients, and even an emetic if required; when it will be generally found that a glass of warm and weak brandy and water, to which one or two drops of creosote have been added, will effectually dispel any disposition to sea-sickness.—*Second Remedy:* As the vessel descends draw in the breath, and as it ascends exhale the breath. This prevents the movements of the organs which act immediately upon sea-sickness.—*Third Remedy:* Observe perfect quietude in the recumbent position, until the body is accustomed to the motion of the vessel, take frequently two or three teaspoonfuls of strong coffee; or twenty drops of spirit of hydrochloric ether.—*Fourth Remedy:* Hold fast by the ropes on the side of the ship, so as to move with all its motions, becoming as it were part of the vessel.—*Fifth Remedy:* Take of camphorated spirit, sal-volatile, and Hoffman's ether, a few drops of each, upon a lump of sugar.

Short Sight.—This defect of vision arises from the cornea of the eye projecting too much, the consequence being, that the rays which pass through it from external objects, placed at the ordinary distance from the eye, are too rapidly collected or brought together, so that the image of things is formed indistinctly and confusedly. To correct this, a person thus affected instinctively brings objects very close to the eye, by doing which, he causes the distinct image formed in the eye to be thrown further back.—*Remedy:* The use of glasses known as "concave;" these counteract the too convex cornea of the eye, by partially scattering the rays of light before they reach the eye. In choosing proper spectacles, the assistance of a respectable optician should be sought. The glasses selected should be the lowest power which can be used for reading comfortably. If they diminish the size of small objects, or if they produce fatigue or dizziness, or if, after taking them off, the light is obscured, they are unfit, and should be instantly changed If once suited, a change for more concave glasses should not be made hastily.—*Caution.* Short sighted persons should not habituate themselves to the use of a single eye-glass, as its employment exercises one eye too actively, while the other eye becomes still worse from want of exertion, and

thus, in course of time, the sight of both eyes—although from dread of opposite causes—is greatly deteriorated.

Pains In Side.—Pains in the side may arise from a rheumatic affection or from derangement of the stomach.—*Remedy:* Regulate the state of the bowels by mild aperients, and if the system seems impoverished, and there has been much debility of the digestive organs, take twenty grains of the sesquioxide of iron twice or thrice a day. Employ the warm bath frequently, and apply to the part affected a muslin bag filled with hops and well soaked in hot water; also rub in every fourth hour the following: Tincture of aconite, half an ounce; soap liniment, one and a half ounces; mix. If the pains be situated high up in the region of the chest, they may be occasioned by inflammatory affection of the lungs, but in this case will be accompanied with more or less fever, and other symptoms indicative of the disorder. Pain on the right side, lower down, may be owing to an affection of the liver; on the left side, to affection of the pain on the left side; it, however, often occurs as a sympathetic affection, sometimes of the heart or lungs, in either sex. It is common in females, at times of functional disorder. Obstinate and increasing pain of the side, which will not go away with the treatment above indicated, must on no account be neglected. There is evidently something radically wrong in the system, and the advice of a medical man must be taken.

Dimness of Sight.—This may arise from effusion on the external coat of the eye, or from disease of the retina—that internal lining, coating of the eye, which receives the impression of external objects; but frequently a dimness of sight arises from a partial derangement of the retina, owing to a bad state of the digestive organs; for as the retina is an expansion of the optic nerve, and as the optic nerve has its source from that part of the brain where the nerves of the stomach arise, it is natural to think that when the stomach is deranged a partial effect must be evident on the eyes.—*Remedy:* When a person feels a dimness of sight, which upon examination he finds does not arise from external derangements of the coats of the eye, he should direct his attention to the treatment of the stomach; an emetic should be first taken, commencing on the day following with small doses of tincture of rhubarb, and continuing the dose daily; take also every morning a teaspoonful of the acidulated decoction of bark, and every seventh or eighth day a five-grain blue-pill. The shower bath, good diet, change of air, and sea-bathing are all excellent remedial measures. Bathe the eye with cold water, and use the following lotion: Sulphate of zinc, one grain; elder-flower water, one ounce; mix. When the eyes are watery and irritable, great benefit will be derived from laudanum, or sedative solution of opium, painted several times over the lids and around the eye at night, and allowed to dry on, and washed off in the morning.

Want of Sleep.—The want of sleep, so distressing in itself, and so wearing to the system, may arise from a variety of causes: pain of the body and anxiety of mind are chief among these. But a person may be kept awake from some simple causes, as over fatigue, want of out-door exercise, or overloaded stomach, cold feet, &c. Again, sleeplessness may exist without any assignable reason.—*First Remedy:* Adopt an easy, recumbent position, inclining the head towards the chest, shut the eyes, and take several deep inspirations with the mouth closed.—*Second Remedy:* Tie a decanter-stopper, with a bright metallic top, a pencil case or any other bright object, on the forehead, in such a position that the eyes must be distorted or strained in order to see it. By resolutely gazing in this way for a short time, without winking, with the mind fully absorbed in the effort, the muscles of the eyes gradually relax, and the person falls asleep.—*Third Remedy:* Just before lying down, drink a tumbler-full of cold spring water with a few grains of carbonate of potash in it.—*Fourth Remedy:* Having placed the body in a comfortable position, commence rolling the eyeballs backwards and forwards, and upwards and downwards; continue doing this until sleep comes on, which will be generally in three or four minutes.—*Fifth Remedy:* Count slowly, and

with the eyes shut, from No. 1 to 1000, or any other number necessary; in the midst of the counting, the person will in all probability fall asleep.—*Sixth Remedy:* Take a warm bath just before going to bed. A warm foot-bath will sometimes answer the purpose.—*Seventh Remedy:* Rub the body well with a rough towel or a flesh-brush for a quarter of an hour, and go to bed immediately.—*Eighth Remedy:* Take a walk in the garden, or up and down the room, until the whole body feels in a warm glow, then go to bed immediately.—*Ninth Remedy:* Cut a Spanish onion into shreds, place it in a basin, and pour boiling vinegar over it; after letting it steep for a short time eat it either alone, or with the ordinary supper food. This mode of treating the onion deprives it in a great measure of its unpleasant taste and smell, while its sleep-inducing properties are but little impaired.—*Tenth Remedy:* Take twenty grains of carbonate of soda the last thing on going to bed.—*Eleventh Remedy:* Camphor twenty-five grains; rectified spirit, five drops; rub the camphor and the spirit well together in a mortar, then add powdered gum-arabic, four drachms; syrup of lemons, half an ounce; peppermint, seven ounces; mix; and take three tablespoonfuls at bedtime.—*Twelfth Remedy:* Get out of bed, turn down the bed-clothes, and walk up and down the room for a few minutes, and then return to bed.—*Thirteenth Remedy:* Take a teaspoonful of paregoric elixir in a wineglassful of water just before lying down.—*Caution.* The habit of procuring sleep by indulgence in opium is exceedingly hurtful, for opium is injurious to the stomach, and loses its effect unless the dose be increased from night to night, which renders it still more injurious.

Sore Throat.—This disease is most prevalent during the spring and autumn of the year, particularly among young people. It is usually the effect of cold caught after dancing, or by wet feet.—*First Remedy:* When the throat is threatened, gargle it with diluted spirit of hartshorn, not so strong as to burn the mouth; rub in also, under the jaw below the chin, the volatile liniment. Take meanwhile a saline purgative —*Second Remedy:* On the first appearance of difficulty in swallowing take of senna tea a cupful, and dissolve in it three drachms of Epsom salts. Bathe the legs and feet in warm water, and go to bed with three or four folds of flannel about the neck; take of spirit of mindererus, one ounce; antimonial wine, thirty drops; water, three ounces; syrup of squills, one drachm; mix, and take a tablespoonful every hour until perspiration is freely induced.—*Third Remedy:* Decoction of bark, seven ounces; tincture of myrrh, two drachms; purified nitre, three drachms; make into gargle, and employ it frequently. *Fourth Remedy:* Put into the mouth a small piece of purified nitre, and let it partially dissolve there; then remove it, and apply it again in a few seconds, and swallow the saliva.—*Fifth Remedy:* Decoction of bark, six ounces; diluted vitriolic acid, one drachm; honey of roses, one ounce; make into a gargle, to be used, mixed with port wine, frequently during the day.—*Sixth Remedy:* Nitre, two drachms; honey, four drachms; water, six ounces; mix for a gargle; to be used frequently.

Spasms.—Persons subject to confined bowels, if they have eaten anything which disagrees with them, are liable to this complaint.—*First Remedy:* Take two teaspoonfuls of antimonial wine every quarter of an hour, till the stomach be thoroughly relieved. Two hours afterwards, take one drachm of sal-volatile, with one ounce of castor-oil.—*Second Remedy:* Oil of aniseed, ten drops; calcined magnesia, one scruple; tincture of rhubarb, two drachms; peppermit water, ten drachms; mix for a draught.—*Third Remedy:* Camphor julep, ten drachms; Hoffmann's ether, compound spirit of lavender, of each one drachm; sal-volatile, fifteen drops; laudanum, ten drops; mix; to be taken during the spasm, drinking afterwards plentifully of warm water.—*Fourth Remedy:* Apply to the pit of the stomach hot flannels moistened with compound camphor liniment and turpentine; drink, also, a glassful of hot brandy and water.—*Fifth Remedy:* Sal-volatile and Hoffmann's ether, of each one and a-half drachm; acetate

of morphine, half a grain ; camphor julep, two ounces ; mix, and take a spoonful when necessary.—*Sixth Remedy :* Immediately the attack comes on, stand perfectly upright, and rub the stomach with the hand until relief is afforded. Take also a teaspoonful of sal-volatile in a wineglassful of water.

Sprains.—When a joint is twisted or strained in a direction contrary to its natural range of motion, or is moved to too great an extent in a natural direction, the injury done to the part is called a sprain.—*First Remedy :* Keep the joint perfectly at rest, the limb being elevated higher than the body generally,in order to diminish the flow of blood to the part,keep the part constantly wet with Goulard water,or vinegar and water. When the inflammation is abated, pump water upon the limb every day for several minutes.—*Second Remedy.* If great pain and swelling set in, apply warm fomentations of camomile and water; and if the pain and swelling do not then subside, a few leeches must be applied.—*Third Remedy.* Wrap round the limb thin folds of rag wetted with cold water; this must be renewed as fast as it dries. When the pain and inflammation have subsided, rub the joint once or twice a day with soap liniment.—*Fourth Remedy.* Bathe the part well with warm water by means of a piece of soft linen, till quite easy, then rub the part gently by the hand, with cold vinegar and water, once every hour or so for a few days.—*Fifth Remedy.* In order to support the parts and restore their tone, a laced stocking should be worn, or a flannel roller applied. It will answer the purpose,also, to apply strips of adhesive plaster in opposite directions round the joint.—*Caution.* The most essential part of the treatment of this complaint consists in keeping the joint at rest. Recovery is often retarded by premature attempts at using the limb; by this imprudence the inflammation is apt to be renewed, and permanent injury done to the limb.

Stammering.—This singular defect of speech sometimes proceeds from functional disorder, sometimes from nervousness, sometimes the result of irritation. From whatever cause it originates, it is in the majority of cases to be cured by an exertion of the will.—*First Remedy.* It is an undoubted fact, that stammerers, although they cannot speak a single sentence without hesitation, can sing a song of many verses as fluently as any person, and it is almost as true that stammerers can read with equal ease. It is therefore to be recommended that those who stammer should begin with a set of exercises of common-place sentences, chant to the first bars of the simplest melody, and from that, practise those sentences upon one note, ending a note lower or higher, slowly at first, but gradually increased to rapidity.—*Second Remedy.* Take between the fingers a pen or pencil, or small stick, or with the finger, write down upon the table, or upon the knee, or anything else, the words spoken, calling out every word as it is written down, and if the stammerer write quickly, he may speak the sentences sufficiently fast and connected. This plan serves to guide the impression of the words upon the brain with proper arrangement.—*Third Remedy.* With every word or syllable the stammerer utters, he should tap his finger on the table or on his knee, and by thus, as it were, "keeping time," he will be able to control his utterances into a certain measure, which will render stammering almost impossible.

Stiff Neck.—A complaint brought on by sitting or sleeping in a draught at an open window, &c.—*Remedy.* Rub the neck well with hartshorn and sweet oil two or three times a day, and wear round the neck a piece of new flannel, moistened with the hartshorn and oil.

Stitch in the Side.—This is frequently brought on by hurried walking or running, or by taking exercise immediately after a meal ; in such cases, it soon subsides, and calls for no remedy.—*Remedy.* Some persons are peculiarly liable to this complaint, and we would advise such persons to keep a peppermint lozenge in their mouths on long pedestrian journeys, &c. It happens sometimes, however, that stitch in the side is a symptom of some other disease existing or coming on ; as inflammation of the lungs,

local injury, &c. When the pain is very acute and protracted, from five to twenty or thirty leeches, according to age and strength, should be applied to the part affected; when they have left off bleeding, a large blister to be applied over the most painful part. When the person is weak, the blister should be applied without the leeches. Take also of calomel twelve grains; powdered opium, three grains; tartar emetic, one grain; treacle, one drop, or enough to make a mass, to be divided into six pills, one every six or eight hours.

Stomach-Ache.—A complaint which usually arises from taking unwholesome or indigestible food—*First Remedy.* Take of magnesia one drachm; rhubarb, half a drachm; powdered ginger, ten grains; divide into three powders; take one of these instantly, mixed in a little water, until it is quite smooth.—*Second Remedy* (for babies). Mix twenty grains of carbonate of magnesia in one ounce of dill-water, to which add ten drops of sal-volatile, give a teaspoonful when the child appears to be in pain.—*Third Remedy* (for children). Give to the child from a half to a teaspoonful of antimonial wine in half a wineglassful of warm water, and repeated every quarter of an hour, until the stomach is thoroughly relieved by vomiting. When this has been effected, give a dose of simple aperient medicine at bedtime, succeeded by a senna draught containing tincture of ginger.—*Fourth Remedy.* Ipecacuanha, four grains; rhubarb, twenty grains; mix and divide into six pills. In cases of persistent stomach-ache, one of these pills to be taken every morning fasting.—*Fifth Remedy.* Cayenne pepper six grains; rhubarb, 20 grains; mix, and divide into six pills, one to be taken half an hour before dinner or any other substantial repast.

Stuns.—Stunning or insensibility is usually caused by a blow on the head; it may be of greater or less severity, and requires prompt relief.—*Remedy.* Place the sufferer in a recumbent position with the head raised. Dash cold water from the hand over the face, or place a wetted handkerchief on the forehead; apply warmth to the feet and legs, and hartshorn or smelling-salts to the nostrils. Keep the patient quiet, and recovery partially or wholly will soon ensue.

St. Vitus's Dance.—This disease is a convulsive action in the muscles, mostly of one side of the body, and principally the arm or leg, or both, Fright is a very common cause of this complaint.—*First Remedy.* Regulate the bowels by a purgative of calomel and rhubarb, repeated every third night; then go through a course of tonics—such as carbonate of iron, one drachm twice a day. Use the shower-bath regularly; take plenty of exercise, with wholesome and nourishing food.—*Second Remedy.* Give three times a day, two grains of the valerianate of zinc, with an occasional gentle aperient.—*Third Remedy.* Apply a blister to the nape of the neck, and continue to do so three or four times a week, until relief is afforded.

Stye in the Eye.—This complaint is most frequently seen in children of fair complexions, and in those of a scrofulous habit of body. In more advanced life it is usually connected with a disordered condition of the digestive organs.—*First Remedy.* Refrain from touching or doing any thing to the swelling until it becomes white, then prick it with a needle to allow of the escape of the accumulated matter.—*Second Remedy.* Take an active purge of calomel and jalap, and constantly apply Goulard water, or vinegar and water; this, if observed in time, will often arrest the progress of the tumor.—*Third Remedy.* Apply to the eye three or four times a day a linseed meal poultice enclosed in a small linen bag, and on each application foment the eye well with warm milk and water. This treatment to be continued until the tumor bursts and the matter is discharged.

Sunburns.—A discoloration of the skin caused by exposure to the sun.—*First Remedy.* Sweet cream, one ounce; new milk, eight ounces; juice of lemon, one ounce; alum, one ounce; sugar one drachm. Boil and skim, and when the liquid is cool apply as a lotion to the face.—*Second Remedy.* Borax, fifteen grains; lemon juice, one ounce; sugar candy, half a drachm; mix the powders with the juice, and let them stand in a bottle, shaking

them occasionally until they are dissolved.—*Third Remedy.* Wash the face night and morning with buttermilk.—*Fourth Remedy.* Alum, one drachm; borax, ten drachms; water one pint; mix, and wash the face with it every hot day just previous to going out.

Sunstroke.—A peculiar form of congestion of the brain, occasioned by long exposure to the heat of the sun, especially when accompanied by over-exertion.—*Remedy.* It is essential to set about the cure of this complaint immediately it is discovered. Throw cold water on the sufferer's head, and plunge his legs into warm water. Let him also take the following mixture: Infusion of senna leaves, a teaspoonful; nitre, half a drachm. Mix. Half to be taken immediately, the other half in three hours. He should also drink plentifully of lemonade or vinegar and water. Linen cloths dipped in cold water and vinegar of roses may be applied to the forehead, temples, or all over the head. As consciousness returns, slight stimulants may be carefully administered.—*Observe.* In this painful visitation the grand aim is to find a prevention rather than a remedy. If a person stand still in the violent heat of the sun, he is more like to receive a sunstroke than if he walk about. The wearing a white hat, or having some folds of clean white paper placed under a black hat, may sensibly contribute to ward off this dangerous malady. A freshly gathered cabbage-leaf placed on the head beneath the hat is also an excellent protection. Persons whose employment renders them liable to these attacks should pay attention to timely warnings; and when they begin to feel violent pains in the head, increasing every moment, they should lose no time in retiring into the shade.

Swooning.—Persons of weak nerves or delicate constitutions are liable to fits of swooning. The general causes are sudden transition from cold to heat, breathing air deprived of its proper elasticity, great fatigue, loss of blood, long fasting, fear, grief, and other violent passions or affections of the mind.—*Remedy.* When anyone falls into a swoon, remove him immediately to a cooler apartment, apply ligatures above his knees and elbows, and sprinkle his hands and face with vinegar or cold water. He should likewise be made to smell the vinegar, and should have a spoonful or two of water, if he can swallow, with about a third part of vinegar mixed with it, poured into his mouth. If these should not remove the complaint, bleeding must be resorted to.—*When a person swoons from being exposed to vitiated air, as that of a theatre, ball-room, &c.*, he ought immediately to be carried into the open air; his temples should be rubbed with strong vinegar or brandy, and salvolatile held to his nostrils. He should be laid upon his back with his head low, and have a little wine or some other cordial poured into his mouth as soon as he is able to swallow it. If the person has been subject to hysterical fits, burnt feathers should be applied to the nostrils.—*Observe.* Persons who are subject to swooning in public assemblies should place themselves near a door or window.

Teething.—Although this is, strictly speaking, a natural development incidental to childhood, it is, nevertheless, usually accompanied by a considerable degree of pain and generally bodily derangement, which to a certain extent gives it the character of a disease. The process generally commences with drivelling, the gums swell, and become hot; a rash sometimes breaks out upon the face or the head, oftentimes behind the ears; the child is peevish and fretful, starts during sleep, often shrieks out suddenly, and crams its fingers into its mouth.—*First Remedy.* Give a gentle emetic of ipecacuanha, rub the gums with syrup of poppies, and administer a dose of castor-oil. If the child go into convulsions, put it immediately into a hot bath, observing to keep the head raised and out of the water. The bowels should be kept open, the child have plenty of pure air, wholesome food, and everything else conducive to health.—*Second Remedy.* If the child appears to suffer much pain, the gums should be lanced. A pinch of saltpetre mixed with honey, and rubbed on the gums, also gives ease.—*Third Remedy.* The looseness of the bowels which often accompanies teething is, within bounds, advantageous rather than not; but when it is attended with any

signs of inflammation about the belly, warm fomentations should be applied, and two grains of ipecacuanha every three or four hours may be given, unless vomiting accompany the diarrhœa. As an astringent, one of the best that can be employed is the compound kino powder, in doses of two grains.

Teeth, Preservation of.—The preservation of the teeth ought to form an important item in the care of the person. The possession of sound teeth is a great blessing, as they not only promote the process of digestion, but keep the breath sweet and pure. Unsound and unclean teeth are also most unsightly and unpleasant for other persons to be brought in contact with; for these combined reasons, the greatest care should be observed in the management of these important organs. It must be understood that the teeth are bones thinly covered over with a fine enamel, and this enamel is more or less substantial in different persons. Whenever this enamel is worn through by too coarse a powder or too frequently cleansing the teeth, or eaten through by a scorbutic humor in the gums, the tooth cannot long remain sound. The teeth, therefore, are to be cleaned but with great precaution, for if the enamel is worn off faster by cleaning the outside than nature supplies it within, the teeth will probably suffer more by this method than by neglect. A butcher's skewer, or the wood with which they they are made must be bruised and bit at the end, till with a little use it will become the softest and best brush for this purpose; and in general the teeth may be cleaned with this brush without any powder. It is necessary to observe that, very near the gums of persons whose teeth are otherwise good, there is apt to grow a false kind of enamel, both within and without, and this false enamel or tartar, if neglected, pushes the gums higher and higher till it leaves the fangs of the teeth quite bare, above the true enamel, so that sound teeth are destroyed, because the gum has forsaken that part which is not sheathed and protected. In the summer months this tartar may be effectually removed by partaking daily of strawberries; eating plentifully of watercress is also considered a good remedy. An excellent tincture for this defect will be found as follows :—Mix six ounces of tincture of Peruvian bark with half an ounce of sal-ammoniac. Shake these well for a few moments every time before the tincture is used. The method of using it is, to take a spoonful and hold it near the teeth, then with a finger dipped in, rubbing the gums and teeth, which are afterwards to be washed with warm water. Another method of preserving the teeth is to wash out the mouth with water after every meal, especially if animal food has been eaten; by these means the particles of food lodging about the teeth and gums are dislodged, which, when allowed to remain and accumulate, prove excessively injurious. Much harm is frequently done to the teeth by cleaning them with too hard a brush or deleterious dentifrices, in either case the enamel being scratched and otherwise injured. As a matter of course, the preservation of the teeth is greatly influenced by what is eaten and drunk. All things that are either very hot or very cold are extremely bad; acids are especially injurious, as are also sweets. *The decaying of teeth* is partly due to chemical decomposition of the food lodged between the teeth in eating. When there is joined to this an unhealthy or weak condition of the ivory, which is thus rendered incapable of resisting the action of external causes, and also the continual pressure of the adjacent teeth, when too close together, then decay is almost sure to take place in some part or other of the crown. When it occurs in the sides of the necks, just below the enamel, the cause always is in the food, and generally so when in the middle of the crown of the molars; but sometimes decay takes place beneath the enamel, and long before the slightest fissure in this part can be detected by any ordinary observation, or, at all events, while there is no opening large enough to admit the food. Besides these causes, another exists in the uncovered state of the roots, or fangs, or in these being covered by tartar instead of gum, both of which circumstances tend to produce decomposition and decay, and should be cautiously guarded against. When a cavity is actually developed, the sooner it is filled the better. When it is small and

has not opened into the natural cavity of the tooth, gold leaf is the best material, the dentist previously cutting away the decayed matter and pressing in the gold with great force. When, however, this cavity is exposed, gold is useless under ordinary circumstances. The following are some of the best methods of filling teeth when beginning to decay :—1. Mix thirteen parts of pure finely powdered caustic lime with twelve parts of anhydrous phosphoric acid. This powder is moist during the mixing, and while in that state is to be introduced into the decayed tooth. The place in the tooth is to be made dry before receiving the mixture. This kind of filling must be used two or three minutes after being prepared. Soon after it is lodged in the decayed cavity, it becomes very solid. 2. Take pure anhydrous phosphoric acid, forty-eight grains, pure caustic (unslaked) lime, forty-two grains. Finely pulverize each separately, and keep them separate in well-stopped bottles till wanted. For use, mix the required quantity in a small mortar, as rapidly and perfectly as possible, and at once press the dry mixture in the cavity of the tooth. The surface should then be smoothed off and finished by moistening with water. This cement soon acquires great hardness; it is very white and durable, and in its composition resembles the natural earthy matter of the teeth. The whole process requires expertness to succeed; but the latter, when attained, will amply repay for one or two failures. If the composition be not mixed and applied quickly it becomes moist, and is therefore unfit for use. In many cases the odor arising from carious teeth is very offensive; to remedy this, the mouth should be well rinsed with a teaspoonful of the solution of chloride of soda in a tumbler of water, which will have the desired effect.

Toothache.—This well-known and very distressing pain may proceed from a variety of causes—from sitting in draughts, inattention to the covering of the feet or the head; food or drink either too hot or too cold, and lastly, from the presence of decay in the tooth itself. For a complaint so common there are, of course, innumerable remedies, and from these we select such as we believe to be the most efficacious.—*First Remedy.* Apply stick-caustic to the part whence the pain proceeds.—*Second Remedy.* Take of tincture of opium, and rectified spirits of wine, of each three ounces; camphor, six drachms; opium powdered, one and a half drachms; pellitory of Spain, half an ounce; macerate for eight days. Dip a small piece of lint into this tincture, and place it in the cavity of the tooth.—*Third Remedy.* Apply oil of cloves on cotton wool.—*Fourth Remedy.* Moisten a piece of lint with a strong spirituous solution of creosote, and closely ram it into the cavity of the tooth.—*Fifth Remedy.* Alum, in powder, two drachms; spirit of nitre, seven drachms; mix; and apply to the tooth.—*Sixth Remedy.* Sal-volatile, three ounces; laudanum, one ounce; mix, and apply.—*Seventh Remedy.* Dry the cavity with lint, then a piece of cotton wool moistened in water of ammonia, with half the quantity of tincture of opium.—*Eighth Remedy.* Creosote, one drachm; spirit of camphor, two drachms; laudanum, one drachm; mix, and apply with a piece of lint.—*Ninth Remedy.* Pellitory, ginger, cloves, camphor, of each one ounce; tincture of opium, four ounces; spirit of wine, sixteen ounces; macerate for eight days and strain.—*Tenth Remedy.* Camphor, one drachm; ether, four drachms; apply. —*Eleventh Remedy.* Opium, two ounces; mastic, half an ounce; balsam of tolu, one drachm; camphor, one ounce; oil of cloves, one drachm; rectified spirit, sixteen fluid ounces; oil of bitter almonds, eight drops; mix.—*Twelfth Remedy.* Cherry-laurel water, two ounces; acetate of morphia, one grain. Wash the mouth with warm water, to a glass of which a few drops of this mixture have been added.—*Thirteenth Remedy.* Oil of rosemary, two ounces; tincture of galbanum, one ounce; mix. Dip into this mixture a piece of cotton wool and introduce it into the ears.—*Fourteenth Remedy.* Tannin, twenty grains; mastic, five grains; ether, two drachms. Wash the mouth with warm water containing a little carbonate of soda; lance the gums, and apply the tincture to the cavity of the tooth on cotton.—*Fifteenth Remedy.* Apply caustic ammonia to the surface repeatedly, care being taken

that the ammonia does not touch the mouth or tongue.---*Sixteenth Remedy.* Heat a wire to a white heat, and insert it into the cavity of the tooth; this operation, if properly performed, will destroy the nerve, while it renders the tooth insensible, and consequently serviceable. This operation is now performed in a more agreeable manner by means of electric heat. The wire is fitted into the tooth cold, and momentarily heated.---*Observe.* If neither of the above remedies avail, the tooth must be extracted; if suffered to remain, the teeth on either side will become affected.---*Seventeenth Remedy* (For toothache from inflamed gums). Mix thirty drops of laudanum with one ounce of water, take mouthfuls of this, and hold it in the mouth. Or, apply ether or chloroform lightly to the gum, also to the cheek outside, covering it with a piece of oilskin, or apply a mustard plaster to the cheek; or apply a bag of camomile flowers heated, and sprinkled with brandy, to the face; to be reheated and applied every ten minutes till relief be obtained.---*Eighteenth Remedy* (For toothache from cold, extending over several teeth and the face). Red spirits of lavender, spirits of sal-volatile, and laudanum, equal parts; mix. Soak in this a pledget of lint or linen rag, and lay it along the gums and around the aching tooth.---*Nineteenth Remedy* (For rheumatic toothache). Take twice or thrice a day four grains of compound ipecacuanha powder; foment the part with a decoction of poppy-heads and camomile flowers. A blister behind the ears will also be found of great service.---*Preventive.* Those who are subject to toothache ought to be particular in keeping the teeth clean by the frequent use of a soft brush and water. The tooth powders most suitable are flowers of sulphur and charcoal powder; the former may be used every day, the latter twice a week. The best common charcoal powder should be employed, not the prepared charcoal, which is too often a compound of hurtful ingredients. When the gums are loose or spongy, the teeth should be cleaned three or four times a week, with a powder composed of equal parts of Peruvian bark, powder of catechu, and Armenian bole.

Uvula, Relaxed.---The uvula is the projection seen at the back part of the mouth, at the entrance to the throat. From the middle of the soft palate, the uvula hangs down into the throat, acting as a valve. It is liable to be inflamed and relaxed, occasioning a troublesome cough, by its length irritating the upper part of the windpipe. The usual mode of treatment is by astringents. *First Remedy.* Take of powdered kino six drachms; powdered alum, and powdered cinnamon, of each two drachms; syrup a sufficient quantity to form an electuary; mix, and take a dessertspoonful occasionally. *Second Remedy.* Cayenne pepper, one scruple; boiling water, six ounces; let this stand in a covered vessel for three hours; then add, common vinegar, three ounces; tincture of myrrh, three drachms; honey of roses, four drachms; mix, and gargle the throat with it frequently. *Third Remedy.* Bruised oak-bark, one ounce; water, one and a half pint; boil down to one pint; strain and add powdered alum, half a drachm; brandy, two ounces; mix, and use as a gargle. *Caution.* Persons of scrofulous habit of body are very subject to this complaint, especially in cold, damp, and foggy weather. They should wear out of doors a piece of flannel round the neck, and within doors a piece of narrow velvet, or a neckerchief. The feet also should be kept warm and dry. In order to prevent the complaint making any way, it would be as well, for persons thus subject, to keep one of the above remedies ready mixed for instant use.

Voice, Loss of.---Public speakers, singers, actors, &c., are subject to loss of voice, amounting, in some instances, to extinction. *First Remedy.* Smoke camphor cigarettes, made as follows: Select a sound and regular stalk of wheat straw; cut it evenly about an inch below and two or three inches above the knot, perforate the knot upwards with a stocking needle, and push down upon it, through the larger end of the stalk, with a knitting needle, a small square of tissue paper. This paper covering the upper surface of the perforated knot forms a kind of medium between it and the air. The long end of the straw is then filled with some small pieces of camphor,

loosely packed, and kept in place with a little plug of tissue paper. Close the lips firmly round the cigarette and draw as you would in smoking a pipe or cigar, but of course without the application of fire. The camphor thus inhaled finds its way direct to the respiratory organs, and affords considerable and speedy relief. A properly made cigarette will last a week; the camphor is to be renewed every night. The cigarette must be held between the lips alone, not by the teeth. *Second Remedy.* Where loss of voice results from the abuse of mercurial preparations, take of sarsaparilla-root a handful; water, one quart; boil for twenty minutes, and after taking the decoction off the fire add fifteen grains of iodide of potassium; dose, a wineglassful twice a day. Also, gargle the throat occasionally with salt water.

Washerwoman's Scall.—The popular name for a soreness and tenderness of the skin, which frequently appears on the arms and wrists after much washing, and is occasioned by the irritation of the soap. *Remedy.* Apply a little spermaceti ointment to the parts, and avoid the washtub until the skin is healed.

Wasting.—The rapid or gradual reduction of the size of the whole body, or of parts thereof, frequently comes on without any evident cause. It is seldom accompanied by pain, difficulty of breathing, cough, or fever, but is usually attended with loss of appetite and impaired digestion, depression of spirits and general languor. *Remedy.* This disease is very difficult of cure, and for its treatment we must endeavor to find out the cause, and, if possible, remove it. If occasioned by worms, these must be destroyed by appropriate medicines; if by excess of any kind, this must be wholly discontinued; if from a scrofulous disposition, tonic medicines must be resorted to; and in like manner the treatment will be the same with that of every other disease which it may either accompany or of which it may be the effect. The diet should be nutritious, generous, and such as is easy of digestion; milk, calves' feet jelly, together with a moderate proportion of beer and wine, and when the stomach is very feeble, spirits; regular walking exercise should be taken in the open air. The surface of the body should be well rubbed, and change of scene and sea-bathing may be resorted to. Of medicines, cod-liver oil is likely to prove the most effectual. *Observe.* It often occurs, more particularly in children, that wasting takes place without derangement of any other process than that of nutrition. In these cases a teaspoonful of cod-liver oil two or three times a day may often be followed by very decided and permanent benefit.

Watery Eye.—If we look closely at the inner corner of the eyelids, we may perceive a little point at each, which is the opening of a duct that runs into the nose. These openings convey the tears from the eye; every time the eye is shut in winking the fluid is forced into those pipes. Now, when either or both become so thickened as to be stopped up, the tears of necessity fall over the cheek, and this is called watery eye.—*Remedy.* As the cause of this disease is most commonly inflammation, it may be relieved in its early stages by a plan directed towards the lessening of that inflammation, and the best is as follows: Free the bowels well with salts; repeat this in three days afterwards, and apply the following eye-water: Take of common water two ounces; sulphate of zinc, four grains; laudanum, half a drachm; mix, and apply frequently. Cold must be strictly avoided.—*Observe.* If the complaint be not removed by the adoption of this treatment, surgical assistance must be obtained immediately, for if the disease be allowed to proceed unchecked, the consequence will be a far more serious and troublesome affection.

Wen.—A tumor mostly situated on the head or neck, and containing a suetty or curd-like substance. They are usually harmless, and except from their situation and unsightliness, do not require interfering with. The most certain mode of proceeding is their being extirpated by a surgeon; the operation is neither difficult nor dangerous. We, nevertheless, present the following palliative remedies.—*First Remedy.* Take of the compound tinc-

ture of iodine from five to ten drops three times a day in a little water, apply also the following ointment night and morning: Iodide of potassium, one drachm, to be rubbed very fine and dissolved with a few drops of water; lard, one ounce; camphor (finely powdered), half a drachm; mix.—*Second Remedy.* Paint the wen over with the compound tincture of iodine for a time, and afterwards bathe it with the following lotion: Muriate of ammonia, half an ounce; spirits of wine, one ounce; elder-flower water, three ounces; mix.—*Third Remedy.* Peruvian bark, one ounce; conserve of roses, two ounces; burnt sponge, half an ounce; simple syrup sufficient to form an electuary. A piece the size of a nutmeg to be taken three times a day.—*Fourth Remedy.* Dissolve forty-eight grains of iodine in one ounce of pure spirits of wine. Give to an adult ten drops of this tincture in half a wineglassful of capillaire and water every morning fasting, give a second dose at ten o'clock, and a third at bedtime. At the end of the first week the dose may be increased to fifteen drops three times a day, and a week afterwards to twenty drops.

White Swelling.—This is a disease of one of the larger joints. It is mostly of a slow or chronic character, and occurs chiefly in the knee, although the elbow-joint, hip-joint, and even ankle-joint are not unfrequently the seat of it. This complaint may result from blows, falls, bruises, cold, fevers, and constitutional disorders.—*First Remedy.* Early attention to this disease will prevent, in almost every case, its dreadful consequences. When the pain commences in the knee, a blister should be put on, and perfect rest strictly observed. If the pain continue after the blister be healed, not a moment should be lost in putting on a caustic issue. The mere application of caustic has been known to cure the disease, but it is indispensable that the patient should not stand a moment on the limb.—*Second Remedy.* In the early stage apply leeches and warm fomentations. If not reduced, put on a plaster made as follows: Reduce to a fine powder two ounces of gum-ammoniac; and then add as much vinegar of squills to it as will form it into a paste, and spread it on a piece of leather and apply.—*Third Remedy.* Melt together in an earthen pipkin two ounces of soap, and half an ounce of litharge plaster; when nearly cold, stir in one drachm of sal-ammoniac, in fine powder, spread upon leather, and apply to the diseased joint.—*Fourth Remedy.* The following is the mode of treatment employed by the late Mr. Scott, of the London Hospital, who effected numerous cures of this disease, and achieved thereby a great reputation: In the first place, the surface of the joint is to be carefully cleansed by a sponge, soft brown soap, and warm water, and then thoroughly dried; next, the surface is to be rubbed with a sponge soaked in camphorated spirits of wine, and this is continued a minute or two until the affected part begins to feel warm, smarts somewhat, and appears red. It is now covered with a soft cerate, made of equal parts of soap cerate and strong mercurial ointment, with camphor. This is to be thickly spread on large square pieces of lint and applied entirely around the joint, extending for at least six inches above and below it. Over this, to the same extent, strips of lead-plaster about an inch and a half broad, are to be applied around the plasters. These strips must be longer or shorter, selected according to the size of the part round which they are to be applied. Over this comes an additional covering of soap-plaster, spread on buckskin leather, cut into four broad pieces, one for the front, one for the back, and the two others for the sides of the joint. Lastly, the whole is to be secured by means of a calico bandage, which is to be put on very gently, and rather with the view of securing the plaster, and giving greater thickness and stability to the whole, than for compressing the joint. These dressings, which need not be disturbed oftener than once a week, if applied in the earlier stages of the disease, seldom fail of effecting a cure.

Whitlow.—An inflammation of the extremity of the finger, which is usually caused by a small quantity of humor being stagnant in that part; whether this has happened in consequence of a bruise, a sting, or a bite.—*First Remedy.* As soon as the disorder is manifest, plunge the finger affected

into water as warm as can be borne, and keep it there for some time, adding hot water every now and then to keep up the desired heat; also direct the steam of hot water into it; doing this constantly for the first day, will often dry the whitlow away. *Second Remedy.* Apply to the whitlow compression with the hand in a degree which can be easily borne, with the view of preventing the formation of the matter, then bind it round with a narrow fillet. Repeat this three or four times in the course of two days, when in all probability the pain and swelling will disappear, leaving a single speck of matter at the point of the finger, immediately under the skin. If vent be given to this by the slightest touch of a needle, the wound will heal up immediately. *Third Remedy.* When an abscess cannot be prevented, a poultice of bread and milk should be applied to favor the formation of matter, and as soon as the abscess is ripe, or what is termed "come to a head," it must be opened with a lancet; afterwards dress the wound with tincture of calendula.

Watch the Pulse.—Every intellectual person should know how to ascertain the state of the pulse in health; then, by comparing it with what it is when he is ailing, he may have some idea of the urgency of his case. Parents should know the healthy pulse of each child,—as now and then a person is born with a peculiarly slow or fast pulse, and the very case in hand may be of that peculiarity. An infant's pulse is a hundred and forty; a child of seventeen, about eighty; and from twenty to sixty years is seventy beats a minute, declining to sixty at four-score. A healthful grown person's pulse beats seventy times in a minute. There may be good health down to sixty; but if the pulse always exceeds seventy there is a disease,—the machine is working itself out; there is a fever or inflammation somewhere, and the body is feeding on itself,—as in consumption, when the pulse is quick, that is, over seventy, gradually increasing with decreased chances of cure, until it reaches a hundred and twenty, when death comes before many days. When the pulse is over seventy for months, and there is a slight cough, the lungs are affected.

Necessary Rules for Sleep.—There is no fact more clearly established in the physiology of man than this, that the brain expends its energies and itself during the hours of wakefulness and that these are recuperated during sleep. If the recuperation does not equal the expenditure, the brain withers; this is insanity. Thus it is in early English history, persons who were condemned to death by being prevented from sleeping always died raving maniacs, and those who are starved to death become insane; the brain is not nourished and they cannot sleep. The practical inferences are three; 1st. Those who think most, who do the most brain work, require the most sleep. 2d. The time "saved" from necessary sleep is infallibly destructive to mind, body and estate. 3d. Give yourself, your children, your servants, give all that are under you, the fullest amount of sleep they will take, by compelling them to go to bed at some regular early hour, and to *rise in the morning at the moment they awake;* and, within a fortnight, Nature, with almost the regularity of the rising sun, will unloose the bonds of sleep the moment enough repose has been secured for the wants of the system. This is the only safe and efficient rule.

To Ascertain the State of the Lungs.—Draw in as much breath as you conveniently can, then count as long as possible in a slow and audible voice without drawing in more breath. The number of seconds must be carefully noted. In a consumptive the time does not exceed 10, and is frequently less than 6 seconds; in pleurisy and pneumonia it ranges from 9 to 4 seconds. When the lungs are sound the time will range as high as from 20 to 35 seconds. To expand the lungs, go into the air, stand erect, throw back the head and shoulders, and draw in the air through the nostrils as much as possible.

After having then filled the lungs, raise your arms, still extended, and suck in the air. When you have thus forced the arms backward, with the chest open, change the process by which you draw in your breath, till the

lungs are emptied. Go through the process several times a day, and it will enlarge the chest, give the lungs better play, and serve very much to ward off consumption.

Syrup for Consumptives.—Of tamarac bark, take from the tree, without rossing, 1 peck; spikenard root, ½ lb.; dandelion root, ½ lb.; hops, 2 oz. Boil these sufficient to get the strength in 2 or 3 gals. water; strain, and boil down to 1 gal.; when blood-warm, add 3 lbs. best honey, and 3 pints best brandy; bottle and keep in a cool place. Dose, drink freely of it 3 times per day before meals, at least a gill or more; cure very certain.

Inhalation of Tar for Consumption.—Mix together 16 ozs. of liquid tar and one fluid oz. liquor of potassa, boil them for a few minutes in the open air, then let it simmer in an iron vessel over a spirit or other lamp in the chamber of the patient. This may at first excite a disposition to cough, but in a sort time it allays it, and removes any tendency to it.

Sleep.—If you wish to sleep well eat sparingly of early suppers. Avoid all arguments or contested subjects near night, as these are likely to have a bad effect upon one who is troubled with sleeplessness at night. Avoid having too much company. Many persons become so excited with the meeting of friends that sleep departs for a time. There is probably nothing better, after cultivating a tranquil mind, than exercise in the open air. By observing these simple rules, sleeplessness, in the majority of instances, may be wholly cured.

Hygienic Rules.—Never eat when much fatigued; wait until rested. Never eat just before you expect to engage in any severe mental or physical exercise. Never eat while in a passion, or when under any great mental excitement, depressing or elevating. Never eat just before taking a bath of any kind, or just before retiring for the night. Never eat between regular meals.

Dynamic Power of Various Kinds of Food.—One lb., of oatmeal will furnish as much power as 2 lbs., of bread, and more than 3 lbs. of lean veal. One lb. of butter gives a working force equal to that of 9 lbs. of potatoes, 12 lbs. of milk and more than 5 lbs. of lean beef. One lb. of lump sugar is equal in force to 2 lbs., of ham, or 8 lbs. of cabbage. The habitual use of spirituous liquors is inimical to health, and inevitably tends to shorten life. A mechanic or laboring man of average size, requires, according to Moleschott, 23 ozs., of dry solid matter, daily, one fifth nitrogenous. Food, as usually prepared, contains 50 per cent. of water, which would increase the quantity to 46 ozs., or 3 lbs. 14 ozs., with at least an equal weight of water in addition daily. The same authority indicates as healthy proportions, of albuminous matter 4.587 ozs., fatty matter 2.964, carbo-hydrate 14.250, salts 1.058, total 22.859 ozs., for daily use. This quantity of food will vary greatly in the requirements of individuals engaged in sedentary employments, or of persons with weak constitutions or impaired digestion, as also whether employed in the open air or within doors; much, also, depending on the temperature. Preference should be given to the food which most readily yields the materials required by nature in the formation of the human frame. Beef contains about 4 lbs. of such minerals in every 100 lbs. Dried extract of beef contains 21 lbs. in each 100 lbs. Bread made from unbolted wheat flour is also very rich in such elements, much more so than superfine flour; hence the common use of Graham bread for dyspepsia and other ailments. The analysis of Liebig, Johnston, and others, give, in 100 parts, the following proportions of nutritious elements, viz., Indian corn 12.30, barley 14.00, wheat 14.06, oats 19.91. A fish diet is well adapted to sustain intellectual, or brain labor. What is required may be best known from the fact that a human body weighing 154 lbs., contains, on a rough estimate, of water 14 gals. (consisting of oxygen 111 lbs., of hydrogen 14 lbs.), carbon 21 lbs., nitrogen 3 lbs. 8 ozs., calcium 2 lbs., sodium 2¼ ozs., phosphorus 1¾ lbs., potassium ½ oz., sulphur 2 ozs. 219 grs., fluorine 2 ozs., chlorine 2 ozs. 47 grs., iron 100 grs., magnesium 12 grs., silicon 2 grs. After death, the human body is, by gradual decay, slowly resolved into these its

component parts, which elements are again used in the complex and wonderful laboratory of nature, to vivify the countless forms of vegetable life. These in their turn fulfil their appointed law by yielding up their substance for the formation of other bodies. What a suggestive comment on mortal ambition to witness the present inhabitants of Egypt engaged in what they consider the lucrative commerce of quarrying out the bones of the ancient inhabitants from the catacombs where they have been entombed for thousands of years and transporting them by the ship-load to England, in order to fertilize the crops which are destined to assist in forming the bone and sinews of the British nation!

Breath, Impure.—There is nothing more annoying to a person of refined feeling, or disagreeable to all who approach him, than to be afflicted with an impure breath; and as the causes are so limited from which it proceeds, and the mode of treatment so simple and attainable by all, it becomes a great social dereliction in any one so afflicted not to immediately avail himself of a remedy. Impure breath can only proceed from three causes, an unhealthy state of the stomach, unclean or decayed teeth, and salivation. For the latter condition there is no remedy till the course of medicine that has produced it has been withdrawn. When depending upon an impure state of the stomach, the best remedy is wormwood or camomile tea, taken in cupfuls, three times a day, with half a teaspoonful of carbonate of soda in each dose, with an aloetic or colocynth pill, twice a week. By this means, persisted in for a short time, the worst case of fetid breath may be conquered, when dependent on a depraved state of the digestive organs. For impure breath, the consequence of the state of the mouth and teeth, the only cure is cleanliness, and where it is inconvenient or impossible to stop the decayed teeth, and the patient is disinclined to have any stumps or shells of teeth removed, the mouth may always be kept clean and perfectly inoffensive by the daily use of the tooth-brush and the following powder.

Powdered cuttlefish	2 drachms.
Powdered myrrh	½ a drachm.
Carbonate of Soda	1 drachm.
Charcoal powder	1 ounce.

This powder should be used freely, and allowed to remain some minutes in the mouth and over the teeth before being washed away.

To effect the same object, but in habitual and long standing cases, the teeth may be cleaned with warm water in which a small quantity of the chloride of lime has been dissolved, in the proportion of half a spoonful to a pint of water. By a simple adherence to one or more of these plans this most unpleasant annoyance can always be mastered, and its repetition prevented.

Pulmonic Wafers.—Lump sugar, licorice, and starch, of each 2 parts; gum, 10 parts; squills and ipecacuanha, of each 5 parts; lactucarium, 2 parts. Mix, and divide into 8 grain lozenges.

The Best Way to take Castor Oil.—It is not generally known that castor oil may most easily be taken mingled with orange juice, a little sugar being added if the juice of the orange is not sweet. The difference between this and any other mode of taking this valuable medicine is surprising.

Signs of Death.—The tying of a tight ligature around one of the fingers of a person supposed to be dead will determine whether life is extinct. If there is still life, the extremity of the finger soon becomes red, the depth of the color increasing to dark red and violet, while the skin above the ligature remains white. This arises from the fact that if there be any circulation of the blood, the ligature prevents the return of the venous blood, while the arteries continue to convey it to the capillaries.

New Method of Embalming.—Mix together 5 pounds dry sulphate of alumine, 1 quart of warm water, and 100 grains of arsenious acid. Inject 3 or 4 quarts of this mixture into all the vessels of the human body. This applies as well to all animals, birds, fishes, &c. This process supersedes the

old and revolting mode, and has been introduced into the great anatomical schools of Paris.

Shaving.—This is a process which may be performed in a slovenly and bungling manner, or it may be done with great art and dexterity. In the first place, the hair should be softened by soaking it in water or a lather of soap, by which it is rendered much more soft and more readily cut. A strong lather of soap is usually applied; which, in the first place, acts as a softener from the water; next as a lubricating fluid it prevents the razor from sticking to the skin, or, as it were, stumbling over its asperities; and lastly, from its semi-solid consistence, it affords a support to the hair when opposed to the edge of the razor. The soap used should be of such a nature as to make a strong lather full of small bubbles, and it should be as free from all superfluous alkali as possible, to avoid irritating the skin. In applying it, it is better to wash the skin beforehand, then brush on the lather with the shaving brush, working it well into the skin, and let it remain to soften the hair for a few minutes, during which any other part of the toilet may be performed. Then apply another coat of lather, and at once proceed to take off the beard with the razor, warmed to the temperature of the skin, or rather above it. Most people find it better to stretch the skin by the other hand, but a very skilful shaver manages the act without this process. The razor should be drawn in a gently sawing manner across the beard, not exactly at right angles to it, but nearly so; the art consisting in getting the two angles correctly, and in avoiding the chop instead of the proper sawing motion. By the two angles are meant that made by the surface of blade with the surface of the skin, and that between its edge and the axis of the hair. The angle with the skin should be as slight as possible, close contact causing adhesion, and thereby impeding the free play of the blade; but anything short of this is the proper mode of holding it. Practice here, however, is the grand point, and without it no one will ever succeed as a shaver. When the head is to be shaved it is better to remove the hair with the scissors to within half an inch, or even less, of the scalp, after which the razor may be used as for the beard, following the direction of the hair, and not meeting it.

Rules for Action, very Short but very Safe.—In health and disease endeavor always to live on the sunny side. Sir James Wylie, late physician to the Emperor of Russia, remarked during long observation in the hospitals of that country, that the cases of death occurring in rooms averted from the light of the sun, were four times more numerous than the fatal cases in the rooms exposed to the direct action of the solar rays. When poison is swallowed, a good off-hand remedy is to mix salt and mustard, 1 heaped teaspoonful of each, in a glass of water and drink immediately. It is quick in its operation. Then give the whites of 2 eggs in a cup of coffee, or the eggs alone if coffee cannot be had. For acid poisons give alcids. In cases of opium poisoning, give strong coffee and keep moving. For light burns or scalds, dip the part in cold water or in flour, if the skin is destroyed, cover with varnish. If you fall into the water, float on the back, with the nose and mouth projecting. For apoplexy, raise the head and body; for fainting, lay the person flat. Suck poisoned wounds, unless your mouth is sore. Enlarge the wound, or better cut out the part without delay, cauterize it with caustic, the end of a cigar or a hot coal. If an artery is cut, compress above the wound; if a vein is cut, compress below. If choked, get upon all-fours and cough. Before passing through smoke take a full breath, stoop low, then go ahead; but if you fear carbonic acid gas, walk erect and be careful. Smother a fire with blankets or carpets; water tends to spread burning oil and increase the danger. Remove dust from the eyes by dashing water into them, and avoid rubbing. Remove cinders, &c., with a soft, smooth wooden point. Preserve health and avoid catching cold, by regular diet, healthy food and cleanliness. Sir Astley Cooper said: "The methods by which I have preserved my own health, are temperance, early rising, and sponging the body every morning with cold water, im-

mediately after getting out of bed; a practice which I have adopted for 30 years without ever catching cold." Water diluted with 2 per cent, of carbolic acid will disinfect any room or building, if liberally used as a sprinkle. Diphtheria can be cured by a gargle of lemon juice, swallowing a little so as to reach all the affected parts. To avert cold from the feet, wear two pairs of stockings made from different fabrics, one pair of cotton or silk, the other of wool, and the natural heat of the feet will be preserved if the feet are kept clean. In arranging sleeping rooms the soundest and most refreshing slumber will be enjoyed when the head is towards the north. Late hours and anxious pursuits exhaust vitality, producing disease and premature death, therefore the hours of labor and study should be short. Take abundant exercise and recreation. Be moderate in eating and drinking, using simple and plain diet, avoiding strong drink, tobacco, snuff, opium and every excess. Keep the body warm, the temper calm, serene and placid; shun idleness; if your hands cannot be usefully employed, attend to the cultivation of your minds. For pure health giving fresh air, go to the country. Dr. Stockton Hough asserts that if all the inhabitants of the world were living in cities of the magnitude of London, the human race would become extinct in a century or two. The mean average of human life in the United States is 39¼ years, while in New York and Philadelphia it is only 23 years; about 50 per cent, of the deaths in these cities being of children under five years of age. A great percentage of this excesslve mortality is caused by bad air and bad food.

Complexion.—The beauty of the complexion is an interesting matter, especially among females. To ensure this important boon, natural means are far better than any artificial ones that can be conceived. Painting the face is a most injurious habit as well as an unnatural one, for as it chokes up the pores of the skin and drives the humors back into the blood, its ill effects may be readily imagined. It totally changes the texture of the skin, and produces pimples; attacks the teeth, destroys the enamel, and loosens them. It also affects the eyes, and renders them painful and watery. Lastly, it penetrates the pores of the skin, acting by degrees on the spongy substance of the lungs and inducing disease. Violet powder is no further injurious than by stopping the pores of the skin; but this is quite injury enough to preclude its use. The effect of painting and powdering the face is bad morally as well as physically; the former habit especially is always associated with immodesty and lax principles. Again, the object in view is thwarted rather than attained. A female subjects her complexion to artificial tints under the impression that they will be mistaken for the bloom of nature, and that she will be admired accordingly. But, although to her partial view the artifice may be hidden, in the eyes of others it becomes palpable enough; and, instead of evoking admiration, only inspires disgust and contempt. Those who live temperately, keep regular hours, are actively employed, and take a due amount of air and exercise, will, generally speaking, have no cause to be ashamed of their complexions. But, if some insuperable defect does exist in spite of every precaution, all the nostrums that it is capable to conceive will not efface the defect; and it is therefore wiser and better to reconcile one's self to the misfortune, than to struggle fruitlessly against it.

Taylor's Remedy for Deafness.—Digest 2 ozs. bruised garlic in 1 lb. oil of almonds for a week, and strain. A drop poured into the ear is effective in temporary deafness.

Hiccough or Hiccup.—A spasmodic affection of the stomach and diaphragm, arising from some peculiar irritation. It is generally symptomatic, but in some instances it appears as a primary disease. When prevailing as a primary affection, hiccough is never attended with danger, and may, in general, be easily removed; but when it arises in any acute disorder, or after a mortification has taken place, it may always be looked upon as the forerunner of death.

Treatment.—A common hiccough is often removed by taking a few sips

of cold water in quick succession, or by a sudden excitement of some degree of fear or surprise. When simple means do not answer, recourse must be had to anti-spasmodics, the most useful for which, in this instance, seem to be ether, musk, and opium, combined, or given separately. In the hiccough incidental to youth or old age, an almost certain remedy is, a small quantity of any powerful acid, as a teaspoonful of vinegar or lemon-juice, or a little peppermint water acidulated with a few drops of sulphuric acid.

Cough Syrup.—Syrup of squills, 2 ozs.; tartarized antimony, 8 grs.; sulphate of morphine, 5 grs.; pulverized gum arabic, ¼ oz.; honey, 1 oz.; water, 1 oz.: mix. Dose for an adult, 1 small teaspoonful; repeat in half an hour if it does not relieve; child in proportion.

Cold in the Head.—Dr. Pollion, of France, says that cold in the head can be cured by inhaling hartshorn. The inhalation by the nose should be seven or eight times in five minutes.

To Cure a Cold.—Before retiring soak the feet in mustard water as hot as can be endured, the feet should at first be plunged in a pail half full of lukewarm water, adding by degrees very hot water until the desired heat is attained, protecting the body and knees with blankets so to direct the vapor from the water as to induce a good sweat. Next, to 2 table-spoonfuls of boiling water, add 1 table spoonful of white sugar and 14 drops of strong spirits of camphor. Drink the whole and cuddle in bed under plenty of bedclothes and sleep it off.

Sore Eyes.—Mercurial ointment is a sovereign remedy for sore and inflamed eyelids. Try it.

India Prescription for Sore Eyes.—Sulphate of zinc, 3 grs.; tincture of opium (laudanum), 1 dr.; rose water, 2 oz.; mix. Put a drop or two in the eye, 2 or 3 times daily.

Another.—Sulphate of zinc, acetate of lead, and rock salt, of each ½ oz.; loaf sugar, 1 oz.; soft water, 12 oz.; mix without heat, and use as other eye waters. If sore eyes shed much water, put a little of the oxide of zinc into a phial of water, and use it rather freely. This will soon effect a cure. Copperas and water has cured sore eyes of long standing; and used quite strong, it makes an excellent application in erysipelas. Alum and the white of an egg is good.

Indian Eye Water.—Soft water, 1 pt.; gum arabic, 1 oz.; white vitriol, 1 oz.; fine salt, ½ teaspoon; put all into a bottle, and shake until dissolved. Put into the eye just as you retire to bed.

Eye Preparations.—Eye Water.—Table salt and white vitriol, of each 1 tablespoon; heat them upon copper plates or in earthenware until dry; the heating drives off the acrid water, called the water of crystallization, making them much milder in their action; now add to them soft water ½ pt.; putting in white sugar, 1 tablespoon; blue vitriol, a piece the size of a common pea. If it should prove too strong in any case, add a little more soft water to a phial of it. Apply it to the eyes 3 or 4 times daily.

Wash for removing Particles of Zinc or Iron from the Eye.—Muriatic acid, 20 drops; mucilage, 1 dr.; mix with 2 fluid ozs. rose water. Iron or steel particles may be extracted by holding near them a powerful magnet.

English Remedy for Cancer.—Take chloride of zinc, bloodroot pulverized, and flour, equal quantities of each, worked into a paste and applied. First spread a common sticking-plaster *much* larger than the cancer, cutting a circular piece from the centre of it a little larger than the cancer, applying it, which exposes a narrow rim of healthy skin; then apply the cancer plaster and keep it on 24 hours. On removing it, the cancer will be found to be burned into, and appears the color of an old shoe-sole, and the rim outside will appear white and parboiled, as if burned by steam. Dress with slippery elm poultice until suppuration takes place, then heal with any common salve.

Cod Liver Oil, as usually prepared, is nothing more or less than cod oil clarified, by which process it is in fact deprived in a great measure of its virtue. Cod oil can be purchased from any wholesale oil dealer for one thirteenth part of the price of cod liver oil as usually sold, and it is easy to clarify it. Dealers might turn this information to good account. To make it more palatable and digestible, put 1 oz. of fine table salt to each quart bottle.

How to Cure Cancer.—The following is said to be a sure cure for cancer: A piece of sticking plaster is put over the cancer, with a circular piece cut out of the centre, a little larger than the cancer, so that the cancer and a small circular rim of the healthy skin next to it is exposed. Then a plaster, made of chloride of zinc, blood-root, and wheat flour, is spread on a piece of muslin the size of this circular opening, and applied to the cancer for 24 hours. On removing it, the cancer will be found burned into and appear of the color and hardness of an old shoe sole, and the circular rim outside of it will appear white and parboiled, as if scalded by hot steam. The wound is now dressed, and the outside rim soon separates, and the cancer comes out in a hard lump and the place heals up. The plaster kills the cancer, so that it sloughs like dead flesh, and never grows again. The remedy was discovered by Dr. Fell, of London, and had been used by him for six or eight years with unfailing success, and not a case has been known of the reappearance of the cancer when this remedy has been applied.

Cancer Ointment.—White arsenic, sulphur, powdered flowers of lesser spearwort, and stinking camomile, levigated together, and formed into a paste with white of egg.

Dropsy Pills—Jalap, 50 grs., gamboge, 30 grs., podophyllin, 20 grs., elaterium, 12 grs., aloes, 30 grs., cayenne, 35 grs., castile soap shaved and pulverized, 20 grs., croton oil, 90 drops; powder all finely, and mix thoroughly; then form into pill mass, by using a thick mucilage made of equal parts of gum arabic and gum tragacanth, and divide in three-grain pills. Dose, 1 pill every two days for the first week; then every 3 or 4 days, until the water is evacuated by the combined aid of the pill with the alum syrup. This is a powerful medicine, and will well acomplish its work.

Dropsy—Syrup and Pills—Queen-of-the-meadow root, dwarf-elder flower berries, or inner bark, juniper berries, horse-radish root, pod milkweed, or silkweed, often called, root of each, 4 oz.; prickly-ash bark or berries, mandrake root; bittersweet; bark of the root of each, 2 oz.; white mustard-seed, 1 oz.; Holland gin, 1 pt. Pour boiling water on all except the gin, and keep hot for 12 hours; then boil and pour off twice, and boil down to 3 qts., and strain, adding 3 lbs. of sugar, and lastly the gin. Dose, take all the stomach will bear, say a wine glass a day, or more.

Cure for Ague.—Cut 3 lemons into thin slices and pound them with a mallet, then take enough coffee to make a quart, boil it down to a pint and pour it while quite hot over the lemons. Let it stand till cold, then strain through a cloth, and take the whole at one dose, *immediately after* the chill is over, and *before* the fever comes on.

Cure for Tape Worm.—Take at one dose ether ⅔ oz.; 2 hours after this take castor oil, 1 oz. The worm is discharged entire or almost so and always with the head intact.

Cure for Drunkenness.—*Warranted a certain Remedy.* Confine the patient to his room, furnish him with his favorite liquor at discretion, diluted with ⅔ of water, as much wine, beer, coffee, and tea as he desires, but containing ⅓ of spirit; all the food—the bread, meat, and vegetables—steeped in spirit and water. On the fifth day of this treatment he has an extreme disgust for spirit, being continually drunk. Keep up this treatment till he no longer desires to eat or drink, and the cure is certain.

Chronic Gout.—To Cure.—Take hot vinegar, and put into it all the table salt which it will dissolve, and bathe the parts affected with a soft piece of flannel. Rub in with the hand and dry the foot, etc., by the fire. Repeat this operation 4 times in 24 hours, 15 minutes each time, for four

days; then twice a day for the same period; then once; and follow this rule whenever the symptoms show themselves at any future time.

For a Weak Back.—Take a beef's gall, pour it into 1 pt. of alcohol, and bathe frequently. It works like a charm.

Dr. Davies' Gout Mixture.—Wine of colchicum, one ounce; spirit of nitrous ether, one ounce; iodide of potassium, two scruples; distilled water two ounces. Mix. A teaspoonful in camomile tea two or three times a day.

Gout Tincture.—Veratrum viride (swamp hellebore), ½ oz.; opium, ¼ oz.; wine, ½ pt.; let them stand for several days. Dose, 15 to 30 drops, according to the robustness of the patient, at intervals of 2 to 4 hours.

Stings and Bites, are often instantaneously cured by washing them with hartshorn or turpentine. Another excellent remedy for the sting of a bee, or wasp, or other insect is to wash thoroughly the parts affected with salt and water.

Be Careful About Paring Your Corns.—A man used a knife freely on his feet the other day, causing the corns to bleed freely, and died with the lock-jaw.

Headache Cure.—Borax has been found by many to be of invaluable service in the case of nervous headache. If applied in the same manner as in washing the hair the result is wonderful. It may be used quite strong, after which rinse the hair carefully with clean water; let the person thus suffering remain in a quiet, well ventilated room until the hair is nearly or quite dry, and if possible, indulge in a short sleep, and there will hardly remain a trace of the headache.

Remedy for Headache.—A Parisian physician has published a new remedy for headaches. He uses a mixture of ice and salt, in proportion of 1 to ½ as a cold mixture and this he applies by means of a little purse of silk gauze, with a rim of gutta percha, to limited spots on the head, when rheumatic headaches are felt. It gives instantaneous relief. The application is from ½ minute to 1½ minutes, and the skin is rendered white and hard by the applications.

Charcoal a Cure for Sick Headache.—It is stated that 2 teaspoons of finely powdered charcoal, drunk in ½ a tumbler of water, will, in less than 15 minutes, give relief to a sick headache, when caused, as in most cases it is, by superabundance of acid on the stomach. We have frequently tried this remedy, and its efficacy in every instance has been signally satisfactory.

Trichina is the term applied to a minute, slender, and transparent worm, scarcely 1-20th of an inch in length, which has recently been discovered to exist naturally in the muscles of swine, and is frequently transferred to the human stomach when pork is used as food. Enough of these filthy parasites have been detected in half a pound of pork to engender 300,000,000 more, the females being very prolific, each giving birth to from 60 to 100 young, and dying soon after. The young thread-like worm at first ranges freely through the stomach and intestines, remaining for a short time within the lining membrance of the intestines, causing irritation, diarrhœa, and sometimes death, if present in sufficient numbers. As they become stronger they begin to penetrate the walls of the intestines in order to effect a lodgment in the voluntary muscles, causing intense muscular pain and severe enduring cramps, and sometime tetanic symptoms. After 4 weeks migration they encyst themselves permanently on the muscular fibre, and begin to secrete a delicate sac which gradually becomes calcareous. In this torpid state they remain during the person's lifetime.

Stammering.—Impediments in the speech may be cured, where there is no malformation of the organs of articulation, by perseverance, for three or four months, in the simple remedy of reading aloud, with the teeth closed, for at least two hours each day.

To Remove Tumors.—Dr. Simpson, of Edinburgh, introduces a hollow acupuncture needle, or very fine *trocar* (a surgical instrument in the form of a fine hollow needle) into their tissue, and injects a few drops of some irri-

tant liquid, such as a solution of chloride of zinc, perchloride of iron, or creosote. The effect is to destroy the vitality of the tumors so treated, and admit of separating them.

Bronchocele.—Enlarged Neck.—To Cure.—Iodide of potassium (often called hydriodate of potash) 2 drs; iodine, 1 dr.; water 2½ oz.; mix and shake a few minutes, and pour a little into a phial for internal use. Dose, 5 to 10 drops before each meal, to be taken in a little water. External Application.—With a feather, wet the enlarged neck, from the other bottle, night and morning, until well. It will cause the scarf skin to peel off several times before the cure is perfect, leaving it tender; but do not omit the application more than one day at most, and you may rest assured of a cure, if a cure can be performed by any means whatever.

Cure for Snake Bites.—The Inspector of Police in the Bengal Government reports that of 939 cases in which ammonia was freely administered 207 victims have recovered, and in the cured instances the remedy was not administered till about 2½ hours after the attack, on the average of the fatal cases the corresponding duration of time was 4½ hours.

Doses of Medicine Generally Used.

Hive Syrup.—Dose for children of one year, ten to twenty drops; from eight to ten years, twenty to forty drops. For sudden croup attacks, the dose should be repeated every fifteen minutes until it operates as an emetic. For adults as an expectorant, from one-half to a teaspoonful.

Syrup Ipecac.—This is a valuable medicine, and should always be kept in families where there are children subject to croup, being peculiarly adapted in such cases by its mildness and efficiency; preferable and safer than Hive Syrup. Dose for children from one to four years, a half to one teaspoonful; from six to eight years, one teaspoonful; to be repeated every fifteen minutes until the patient vomits.

A towel wrung out in hot water and placed upon the chest and throat, changing every ten minutes, with a dry towel thoroughly covering it, will often materially assist in relieving an attack of croup.

N. B. Croup is a dangerous disease, and although the above remedy should be given in the first symptom of an attack, medical aid should be present.

Aromatic Syrup of Rhubarb.—This is a warm stomachic laxative, well calculated for the bowel complaints of infants. The dose for an infant diarrhœa is a teaspoonful. A child two to four years old, two or three teaspoonfuls.

Syrup of Senna.—A pleasant cathartic for children, to whom it may be given in doses of one or two spoonfuls.

Tincture of Guaiacum.—Dose. One teaspoonful in a tablespoonful of milk or sugar and water, three times a day, to be gradually increased if necessary. Used for rheumatism, gout, etc.

Laudanum.—Dose for an adult, fifteen to thirty drops; for a child four years old, two drops. It should not be given to younger children except by the advice of a physician.

Elixir Proprietatis.—Used for a constipated state of the bowels as a stomachic laxative. Dose, from one to two teaspoonfuls in sugar and hot water.

Paregoric.—Dose for an adult, one to two teaspoonfuls; for a child one year old, the dose is from three to ten drops.

Sweet Spirits of Nitre.—Dose for an adult, from one-half to a teaspoonful in a wineglass of water; children two to four years, ten drops; six to ten years, twenty drops.

Egyptian Cure for Cholera.—Best Jamaica ginger root, bruised, 1 oz., cayenne, 2 teaspoonfuls; boil all in 1 qt. of water to ½ pt., and add loaf sugar

to form a thick syrup. Dose, 1 tablespoonful every 15 minutes, until vomiting and purging ceases; then follow up with a blackberry tea.

Indian Prescription for Cholera.—First dissolve gum camphor, ½ oz. in 1½ oz., of alcohol; second, give a teaspoon of spirits of hartshorn in a wineglass of water, and follow it every 5 minutes with 15 drops of the camphor in a teaspoon of water, for 3 doses; then wait 15 minutes, and commence again as before; and continue the camphor for 30 minutes, unless there is a returning heat. Should this be the case, give one more dose, and the cure is effected; let them perspire freely (which the medicine is designed to cause), as upon this the life depends, but add no additional clothing. Another.—Tincture kino, 1 ounce, tincture opii, 4 drachms, amylum (common starch), 1 ounce, tepid water, 6 ounces. Mix. Inject slowly into the bowels. The injection mixture should be of the consistency of thin gruel. If it should come away it should be immediately repeated. If the injection be properly administered and in sufficient quantities it will stop the discharge from the bowels in fifteen minutes, and nothing will pass them for several days. The patient is then safe.

Isthmus Cholera Tincture.—Tincture of rhubarb, cayenne, opium, and spirits of camphor, with essence of peppermint, equal parts of each, and each as strong as can be made. Dose, from 5 to 30 drops, or even to 60, and repeat, until relief is obtained, every 5 to 30 minutes.

Sir James Clarke's Diarrhœa and Cholera Mixture.—Tincture of opium, tincture of camphor, and spirits of turpentine, of each 3 drs.; oil of peppermint, 30 drops; mix. Dose, 1 teaspoonful for cholera.

To Prevent a Felon.—When soreness is felt, immerse the finger in a basin of ashes and cold water, set in the stove while cold, and stir it continually without taking it out, till the lye is so hot that it cannot be borne any longer. If the soreness is not gone in half an hour repeat it.

A Sure Remedy for a Felon.—This very painful eruption, with all the remedies recommended, is seldom arrested until it has run a certain course, after causing great suffering during two or three days and nights. The following remedy is vouched for by "The Buffalo Advocate" as a certain thing, from its own knowledge: "Take a pint of common soft soap, and stir in air-slacked lime until it is of the consistency of glazier's putty. Make a leather thimble, fill it with this composition, and insert the finger therein, and a cure is certain.

Felons.—If Recent to Cure in Six Hours.—Venice turpentine, 1 oz.; and put into it half a teaspoonful of water, and stir with a rough stick until the mass looks like candied honey; then spread a good coat on a cloth, and wrap around the finger. If the case is only recent it will remove the pain in six hours.

Cure for Bone Felon.—An old physician gives the following as an infallible remedy: As soon as the parts begin to swell, get the tincture of lobelia and wrap the part affected with cloth thoroughly saturated with the tincture, and the felon is dead.

Remedy for Neuralgia.—Hypophosphite of soda taken in 1 dr. doses 3 times per day in beef tea is a good remedy for this painful affection. So is the application of bruised horse-radish, or the application of oil of peppermint applied lightly with a camel-hair pencil.

Cure for Lock Jaw.—Said to be Positive.—Let any one who has an attack of lock jaw take a small quantity of spirits of turpentine, warm it, and pour it on the wound—no matter where the wound is, or what its nature is—and relief will follow in less than one minute. Turpentine is also a sovereign remedy for croup. Saturate a piece of flannel with it, and place the flannel on the throat, and chest—and in very severe cases three to five drops on a lump of sugar may be taken internally.

Spasms.—Acetate of morphia, 1 gr.; spirit of sal volatile, 1 oz.; sulphuric ether, 1 oz., camphor julep, 4 ozs. Mix. Dose, 1 teaspoonful in a glass of cold water, or wine, as required. Keep closely corked, and shake well before using.

For Disease of the Kidneys.—Boil 1 oz. of pareira brava in 3 pints of water down to 1 pint. Dose, a wineglassful 3 times a day.

Boils.—Boils are popularly said to be "healthy," but this is an error; for although they oftener make their appearance on the bodies of the robust than on those of the sickly and delicate, they undoubtedly arise from some derangement of the system, and clearly denote that moderation in diet, and regularity of habit, are needed.

First Remedy.—As boils must go through a regular course of forming and coming to a head, the first thing is to hasten their progress, and for this, nothing is better than a poultice of linseed-meal. When the head is formed, it should be lanced, and linseed-poultices again applied, until the core of the boil comes away. When this takes place, the wound may be healed as speedily as possible; and to facilitate this, the part should be covered with a little pure hog's-lard spread on a linen rag. In the meantime, the regularity of the bowels should be attended to.

In Case of Excessive Bleeding.—If the blood comes from a wound by jets or spirts, be spry, or the man will die in a few minutes, because an artery is severed; tie a handkerchief loosely around near the part between the wound and the heart. Put a stick between the handkerchief and the skin, twist it around until the blood ceases to flow, and keep it there until the doctor arrives; if in a position where the handkerchief cannot be used, press the thumb on the spot near the wound, between the wound and the heart, increasing the pressure until the bleeding ceases, (do not lessen the pressure until the physician arrives, for an instant), so as to glue up the wound by coagulation or hardening of the cooling blood.

Remedy for Diphtheria.—The treatment consists in thoroughly swabbing the back of the mouth and throat with a wash made thus: Table salt, 2 drs.; black pepper, golden seal, nitrate of potash, alum, 1 dr. each; mix and pulverize; put into a teacup half full of water; stir well, and then fill up with good vinegar. Use every half hour, 1, 2 and 4 hours, as recovery progresses. The patient may swallow a little each time. Apply 1 oz. each time of spirits of turpentine, sweet oil, and aqua-ammonia, mixed, every hour to the whole of the throat, and to the breast bone every four hours, keeping flannel to the part.

Warts and Corns.—To Cure in Ten Minutes.—Take a small piece of potash and let it stand in the open air until it slacks, then thicken it to a paste with pulverized gum arabic, which prevents it from spreading where it is not wanted.

Celebrated Pile Ointment.—Take carbonate of lead, ½ oz.; sulphate of morphia, 15 grs.; stramonium ointment, 1 oz.; olive oil, 20 drops. Mix and apply 3 times per day, or as the pain may require.

Another.—Powdered nut gall, 2 drs.; camphor, 1 dr.; melted wax, 10 oz.; tincture of opium, 2 drs.; mix.

Russia Salve.—Take equal parts of yellow wax and sweet oil; melt slowly, carefully stirring; when cooling, stir in a small quantity of glycerine. Good for all kinds of wounds, &c.

London Liniment.—Take chloroform, olive oil, and aqua ammonia, of each 1 oz.; acetate of morphia, 10 grains. Mix and use as other liniments. Very valuable.

Magnetic Ointment.—Said to be Trask's.—Hard raisins cut in pieces, and fine-cut tobacco, equal weights; simmer well together, then strain, and press out all from the dregs.

Ointments.—For Old Sores.—Red precipitate, half oz.; sugar of lead, half oz.; burnt alum, one oz.; white vitriol, quarter oz., or a little less; all to be very finely pulverized; have mutton tallow made warm, half lb.; stir all in, and stir until cool.

French Remedy for Chronic Rheumatism.—Dr. Bonnet, of Granlbet, France, states, in a letter to the "Abeille Medicale," that he has been long in the habit of prescribing "the essential oil of turpentine by friction for rheumatism; and that he has used it himself with perfect success, having

almost instantaneously got rid of rheumatic pains in both knees and in the left shoulder."

German Rheumatic Fluid.—Oils of hemlock and cedar, of each half oz., oils of origanum and sassafras, each one oz.; aqua ammonia, one oz.; capsicum pulverized, one oz.; spirits of turpentine and gum camphor, each half oz.; put all into a quart bottle, and fill with 95 per cent. alcohol. Dose, for colic, for man, half a teaspoonful; for a horse, half to one oz., in a little warm water, every 15 minutes, till relieved.

Remedy for Rheumatism and Stiff Joints.—Strong camphor spirits, one pt.; neat's-foot, coon, bear's, or skunk's oil, one pt.; spirits of turpentine, half pt. Shake the bottle when used, and apply three times daily, by pouring on a little at a time, and rubbing in all you can for twenty or thirty minutes.

Inflammatory Rheumatism.—Sulphur and saltpetre, of each one oz.; gum guaiacum, quarter oz.; colchicum root, or seed, and nutmegs, of each, quarter oz.; all to be pulverized and mixed with simple syrup, or molasses, two oz. Dose, one teaspoonful every two hours until it moves the bowels rather freely; then three or four times daily until cured.

Infant's Syrup.—The syrup is made thus: One lb. best box raisins; half oz. of anise seed; two sticks licorice; split the raisins, pound the anise seed, and cut the licorice fine; add to it three quarts of rain water, and boil down to two quarts. Feed three or four times a day, as much as the child will willingly drink. The raisins strengthen, the anise expels the wind, and the licorice is a physic.

Soothing Syrup.—Alcohol, oil of peppermint, castor oil, of each one oz.; mix; add oil of anise, half drachm; magnesia, 60 grains; pulverized ginger, forty grains; water, two oz.; white sugar to form a syrup.

Soothing Syrup.—Take one lb. of honey; add two tablespoonfuls of paregoric, and the same of oil of anise seed; add enough water to make a thick syrup, and bottle. For children teething, dose, teaspoonful occasionally.

Compound Syrup of Hypophosphites and Iron.—Dissolve 256 grs. each of hypophosphites of soda, lime and potassa, and 126 grs. hypophosphite of iron, in 12 oz. water, by a water bath. Filter and add sufficient water to make up for the evaporation. Add 18 ozs. sugar by gentle heat, to make 21 fluid ozs. syrup. Each fluid oz. contains 12 grs. each of the hypophosphites of soda, lime and potassa, and 6 grs. hypophosphite of iron.

Compound Syrup of Hypophosphites.—Take of hypophosphite of lime, one and half oz.; hypophosphite of soda, half oz.; hypophosphite of potassa, half oz.; cane sugar, one lb. troy; hot water, 20 fluid ozs.; orange water, one fluid oz. Mix a solution of the mixed salts in the hot water, filter through paper, dissolve the sugar in the solution by heat, and strain, and add the orange flower water. Dose, a teaspoonful, containing nearly five grains of the mixed salts.

Cathartic Syrup.—Best senna leaf, one oz.; butternut, the inner bark of the root, dried and bruised, two oz.; peppermint leaf, half oz.; fennel seed, half oz.; alcohol, half pt.; water, one and a half pts.; sugar, 2 lbs.; put all into the spirit and water, except the sugar, and let it stand two weeks, then strain, pressing out from the dregs, adding the sugar and simmering a few minutes only, to form the syrup. If it should cause griping in any case, increase the fennel seed and peppermint leaf. Dose, one tablespoon, once a day, or less often if the bowels become too loose, up to the next period when the headache might have been expected, and it will not be forthcoming.

Whooping Cough Syrup.—Best rum, one pt.; anise oil, two ozs.; honey, one pt.; lemon juice, 4 ozs.; mix. Dose for adults, one tablespoonful, three or four times per day; children, one teaspoon, with sugar and water.

Composition Powder.—Thompson's.—Bayberry bark, two lbs.; hemlock bark, one lb.; ginger root, one lb.; cayenne pepper, two ozs.; cloves, two ozs.; all finely pulverized and well mixed. Dose, half a teaspoon of it, and a spoon of sugar; put them into a teacup, and pour it half full of boiling

water; let it stand a few minutes, and fill the cup with milk, and drink freely. If no milk is to be obtained, fill up the cup with hot water.

Vegetable or Composition Powder.—Fine bayberry bark, one lb.; ginger, eight oz.; common cayenne, 3 ozs.; mix. Dose, one teaspoonful in a cup of boiling water, sweeten and add milk.

Indian Balsam.—Clear, pale resin, three lbs., and melt it, adding spirits of turpentine, one qt.; balsam of tolu, one oz.; balsam of fir, four ozs.; oil of hemlock, origanum, with Venice turpentine, of each, one oz.; strained honey, four ozs.; mix well, and bottle. Dose, six to twelve drops; for a child of six, three to five drops, on a little sugar. The dose can be varied according to the ability of the stomach to bear it, and the necessity of the case. It is a valuable preparation for coughs, internal pains, or strains, and works benignly upon the kidneys.

Vegetable Substitute for Calomel.—Jalap, one oz.; senna, two oz.; peppermint, one oz. (a little cinnamon if desired), all pulverized and sifted through gauze. Dose, one teaspoonful put in a cup with two or three spoonfuls of hot water, and a good lump of white sugar; when cool, drink all; to be taken fasting in the morning; drink freely; if it does not operate in three hours repeat half the quantity; use instead of calomel.

Dalby's Carminative.—Magnesia, two drs.; oil peppermint, three drops; oil nutmeg, seven drops; oil anise, nine drops; tinct. of castor, one and a half drs.; tinct. of assafœtida, forty-five drops; tinct. of opium, eighteen drops; essence pennyroyal, fifty drops; tinct. of cardamoms, ninety-five drops; peppermint water, seven ozs.; mix.

Sweating Drops.—Ipecac, saffron, boneset, and camphor gum, of each, three ozs.; opium, one oz.; alcohol, two qts. Let stand two weeks and filter. A teaspoonful in a cup of hot sage or catnip tea every hour until free perspiration is induced; good in colds, fevers, inflammations, &c. Bathe the feet in hot water at the same time.

Substitute for Arrowroot.—Finest potato starch, seventy-five lbs.; lump sugar, four lbs.; finely-ground rice, twenty-one lbs. Mix, and sift through lawn; yields one hundred lbs. excellent arrowroot.

Liquid Opodeldoc.—Warm brandy one qt.; add to it gum camphor, one oz.; sal ammoniac, quarter oz.; oils of origanum and rosemary, each half oz.; oil wormwood, quarter oz.; when the oils are dissolved, add six ozs. soft soap.

Brandreth's Pills.—Take two lbs. of aloes, one lb. of gamboge, four ounces of extract of colocynth, half lb. of Castile soap, three fluid drachms of oil of peppermint, and one fluid drachm of cinnamon. Mix, and form into pills.

Diuretics—Pills.—Solidified copaiba, two parts; alcoholic extract of cubebs, one part; formed into pills with a little oil of juniper. Dose, one or two pills three or four times daily. This pill has been found very valuable in affections of the kidneys, bladder, and urethra, as inflammation from gravel, gonorrhœa, gleet, whites, leucorrhœa, common inflammations, &c. For giving them a sugar coat, see that heading, if desired.

Diuretic Drops.—Oil of cubebs, quarter oz.; sweet spirits of nitre, half oz.; balsam of copaiba, one oz.; Harlem oil, one bottle; oil of lavender, twenty drops; spirits of turpentine, twenty drops; mix. Dose, ten to twenty-five drops, as the stomach will bear, three times daily. It may be used in any of the above diseases with great satisfaction.

Diuretic Tincture.—Green or growing spearmint mashed, put into a bottle, and covered with gin, is an excellent diuretic.

Diuretic for Children.—Spirits of nitre, a few drops in a little spearmint tea, is all sufficient. For very young children, pumpkin-seed, or watermelon-seed tea is perhaps the best.

Pills.—To Sugar Coat.—Pills to be sugar coated must be very dry, otherwise they will shrink away from the coating, and leave it a shell easily crushed off. When they are dry, you will take starch, gum arabic, and white sugar, equal parts, rubbing them very fine in a marble mortar, and if

damp, they must be dried before rubbing together; then put the powder into a suitable pan, or box, for shaking; now put a few pills into a small tin box having a cover, and pour on to them just a little simple syrup, shaking well to moisten the surface only; then throw into the box of powder, and keep in motion until completely coated, dry, and smooth. If you are not very careful, you will get too much syrup upon the pills; if you do, put in more, and be quick about it to prevent moistening the pill too much, getting them into the powder as soon as possible.

Fly Paper.—Coat paper with turpentine varnish, and oil it to keep the varnish from drying.

Court Plaster.—Brush silk over with a solution of isinglass, in spirits or warm water, dry and repeat several times. For the last application apply several coats of Balsam of Peru. Used to close cuts or wounds, by warming it and applying. It does not wash off until the skin partially heals.

Liver Pill.—Leptandrin, 40 grs.; podophyllin and cayenne, 30 grs. each; sanguinarin, iridin, and ipecac, 15 grs. each; see that all are pulverized and well mixed; then form into pill mass by using half dr. of the soft extract of mandrake and a few drops of anise oil; then roll out into three-grain pills. Dose, two pills taken at bed-time will generally operate by morning; but some persons require three.

Abernethy's Pills.—Each pill contains two grains of blue pill and three grains compound extract of colocynth.

Medical Use of Salt.

In many cases of disordered stomach a teaspoon of salt is a certain cure. In the violent internal agony termed cholic, add a teaspoon of salt to a pint of cold water, drink it, and go to bed; it is one of the speediest remedies known. The same will revive a person who seems almost dead from a heavy fall.

In an apoplectic fit no time should be lost in pouring down water, if sufficient sensibility remains to allow of swallowing; if not, the head must be sponged with cold water until the sense returns, when salt will completely restore the patient from the lethargy.

In a fit, the feet should be placed in warm water, with mustard added, and the legs briskly rubbed, all bandages removed from the neck, and a cool apartment procured, if possible. In many cases of severe bleeding at the lungs, and when other remedies fail, Dr. Rush found that two teaspoons of salt completely stayed the blood. In case of a bite from a mad dog, wash the part with a strong brine for an hour, and then bind on some salt with a rag.

In toothache, warm salt and water held to the part, and removed two or three times, will remove it in most cases. If the gums be affected, wash the mouth with brine. If the teeth be covered with tartar, wash them twice a day with salt and water.

In swelled neck, wash the part with brine, and drink it, also, twice a day, until cured.

Salt will expel worms, if used in food in a moderate degree, and aid digestion; but salt meat is injurious if used much.

Ink stains should never be put into soapy or soda-water, or ley, as they directly become iron moulds; but should be instantly wetted with clean water, and may be at once removed by the application of a little lemon juice or salt of lemon.

Camphor Ice.—Spermaceti, one and a half oz.; gum camphor, three-quarters oz.; oil sweet almonds, four teaspoonfuls; set on the stove in an earthen dish till dissolved; heat just enough to dissolve it. While warm pour into small moulds, if desired to sell; then paper, and put into tinfoil; used for chaps on hands or lips.

DRUGGIST'S COLORS.—*Yellow*, take iron filings, hydrochloric acid to dissolve, dilute with cold water. *Red*, solution of sal ammonica, cochineal, to color. *Blue*, indigo, one part; oil of vitriol, two parts; dissolve, then dilute with water. *Green*, verdigris, one part; acetic acid, three parts; dilute with water. *Purple*, cochineal, 25 grs.; sugar of lead, one oz.; dissolve.

HOLLOWAY'S OINTMENT AND PILLS.—Butter, 22 oz.; beeswax, 3 oz.; yellow rosin, 3 oz.; melt; add vinegar of cantharides, 1 oz.; evaporate; and add Canada balsam, 1 oz.; oil of mace, ½ dram; balsam of Peru, 15 drops. *Pills:* Aloes, 4 parts; myrrh, jalap, and ginger, of each 2 parts; mucilage to mix.

JUDKIN'S OINTMENT.—Linseed oil, 1 pt.; sweet oil, 1 oz.; and boil them in a kettle on coals for nearly 4 hours, as warm as you can; then have pulverized and mixed borax, ½ oz.; red lead, 4 oz.; and sugar of lead, 1½ oz.; remove the kettle from the fire, and thicken in the powder; continue the stirring until cooled to blood heat, then stir in 1 oz. of spirits of turpentine; and now take out a little, letting it get cold, and if not then sufficiently thick to spread upon thin soft linen as a salve, you will boil again until this point is reached. It is good for all kinds of wounds, bruises, sores, burns, white swellings, rheumatisms, ulcers, sore breasts; and even where there are wounds on the inside, it has been used with advantage, by applying a plaster over the part.

GREEN OINTMENT.—Honey and beeswax, each ½ lb.; spirits of turpentine, 1 oz.; wintergreen oil and laudanum, each, 2 oz.; verdigris, finely pulverized, ¼ oz.; lard, 1½ lb.; mix by a stove fire, in a copper kettle, heating slowly.

TO EXTRACT ESSENTIAL OIL FROM WOOD, BARKS, ROOTS, HERBS, &C.—Take balm, mint, sage, or any other herb, &c., put it into a bottle, and pour upon it a spoonful of ether; keep in a cool place a few hours, and then fill the bottle with cold water; the essential oil will swim upon the surface and may be easily separated.

GREEN MOUNTAIN SALVE.—For Rheumatism, burns, pains in the back or side, &c., take 2 lbs. resin, burgundy pitch, ¼ lb.; beeswax, ¼ lb.; mutton tallow, ¼ lb.; melt slowly; when not too warm, add oil hemlock, 1 oz.; balsam fir, 1 oz.; oil of origanum, 1 oz.; oil of red cedar, 1 oz.; Venice turpentine, 1 oz.; oil of wormwood, 1 oz.; verdigris, ½ oz. The verdigris must be finely pulverized and mixed with the oils; then add as above, and work in cold water like wax till cold enough to roll; rolls 5 inches long, 1 inch diameter, sell for 25 cents.

DOWNER'S SALVE.—Beeswax, 4 oz.; opium, ¼ oz.; sugar of lead, 1 oz.; melt the beeswax, and rub the lead up in the wax, then the opium, then 1 gill of sweet oil, incorporate all thoroughly together, spread lightly on cloth; good for burns, piles, &c.

ANOTHER SALVE.—Burgundy pitch, beeswax, white pine pitch, and resin, 1 oz. each; mutton tallow, 8 oz.; goose oil, 1 gill; tar, 1 gill; melt and mix thoroughly. A first-rate salve.

COOK'S ELECTRO-MAGNETIC LINIMENT.—Best alcohol, 1 gal.; oil of amber, 8 oz.; gum camphor, 8 oz.; Castile soap, shaved fine, 2 oz.; beef's gall, 4 oz.; ammonia, 3 F.'s strong, 12 oz.; mix and shake occasionally for 12 hours, and it is fit for use. This will be found a strong and valuable liniment.

MEAD'S SALT-RHEUM OINTMENT.—Aquafortis, 1 oz.; quicksilver, 1 oz.; good hard soap, dissolved so as to mix readily, 1 oz.; prepared chalk, 1 oz.; mixed with 1 lb. of lard; mix the above by putting the aquafortis and quicksilver into an earthen vessel, and when done effervescing, mix with the other ingredients, putting the chalk in last; add a little spirits of turpentine, say ½ tablespoon.

BARRELL'S INDIAN LINIMENT.—Alcohol, 1 qt.; tincture of capsicum, 1 oz.; oil of origanum, sassafras, pennyroyal, and hemlock, of each ½ oz. Mix.

ITCH OINTMENT.—Unsalted butter, 1 lb.; burgundy pitch, 2 oz.; spirits of turpentine, 2 oz.; red precipitate, pulverized, 1½ oz.; melt the pitch and add the butter, stirring well together; then remove from the fire, and when a little cool add the spirits of turpentine, and lastly the precipitate, and stir until cold.

Lip Salve.—Dissolve a small lump of white sugar in a tablespoonful of rosewater, (common water will do, but is not as good.) Mix it with a couple of large spoonfuls of sweet oil, a piece of spermaceti, of the size of half a butternut. Simmer the whole well together eight or ten minutes, then turn it into a small box.

Felon Ointment.—Take sweet oil, ½ pt., and stew a 3-cent. plug of tobacco in it until the tobacco is crisped; then squeeze it out, and add red lead, 1 oz., and boil until black; when a little cool, add pulverized camphor gum, 1 oz.

Magnetic Pain Killer, for Toothache and Acute Pain.—Laudanum, 1 dr.; gum camphor, 4 drs.; oil of cloves, ½ dr.; oil of lavender, 1 dr.; add to them 1 oz. alcohol, 6 drs. sulphuric ether, and five fluid drs. chloroform. Apply with lint, or for toothache rub on the gums, and upon the face against the teeth.

Davis' Pain Killer Improved.—Powdered guaiac, 20 lbs.; camphor, 2 lbs.; powdered cayenne pepper, 6 lbs.; caustic liquor of ammonia, 1 lb.; powdered opium, ½ lb.; digest these ingredients in 32 gals. alcohol for two weeks, and filter.

Radway's Renovating Resolent.—A vinous tincture of ginger and cardamon, sweetened with sugar.

Radway's Ready Relief.—According to Peckolt, is an ethereal tincture of capsicum, with alcohol and camphor.

Bogle's Hyperion Fluid.—To 8 oz. of 90 or 95 per cent. alcohol, colored red with alkanet, add 1 oz. of castor oil; perfume with geranium and verbena.

Medicated Cough Candy.—To 5 lbs. candy just ready to pour on the slab, add the following mixture, and form it into sticks to correspond with the price asked for them: Tinct. squills, 2 oz; camphorated tinct. of opium and tinct. of tolu, of each ½ oz.; wine of ipecac., ½ oz.; oils of gaultheria, 4 drops; sassafras, 3 drops; and of anise seed oil, 2 drops, and use this freely in common coughs.

Ague Pill.—Quinine, 20 grs.; Dover's powders, 10 grs.; subcarbonate of iron, 10 grs.; mix with mucilage of gum arabic and form into 20 pills. Dose, 2 each hour, commencing 5 hours before the chill should set in. Then take 1 night and morning until all are taken.

Worm Lozenges.—Powdered lump sugar, 10 oz.; starch, 5 oz.; mix with mucilage; and to every ounce add 12 grains calomel; divide into 20 grain lozenges. Doze, two to six.

Swaim's Vermifuge.—Wormseed, 2 oz.; valerian, rhubarb, pinkroot, white agaric, of each 1½ oz.; boil in sufficient water to yield 3 quarts of decoction, and add to it 10 drops of oil of tansy and 45 drops of oil of cloves, dissolved in a quart of rectified spirits. Dose, 1 teaspoonful at night.

Fahnestock's Vermifuge.—Castor oil, oil of worm seed, each 1 oz.; oil anise, ½ oz.; tincture myrrh, ½ dram; oil turpentine, 10 minims. Mix.

Ayer's Sarsaparilla.—Take 3 fluid ozs. each of alcohol, fluid extracts of sarsaparilla and of stillingia; 2 fluid ozs. each, extract of yellow-dock and of podophyllin, 1 oz. sugar, 90 grs. iodide of potassium, and 10 grs. iodide of iron.

Tinctures are made with 1 oz. of gum, root, or bark, &c., dried, to each pint of proof spirits; let it stand one week, and filter.

Essences are made with 1 oz. of any given oil, added to 1 pint alcohol. Peppermints are colored with tinct. turmeric; cinnamon with tinct. of red sanders; wintergreen with tinct. kino.

Atkinson's Infant's Preservative.—Carbonate of magnesia, 6 drs. sugar, 2 oz.; oil of anise seed, 20 drops; sal-volatile, 2½ drs.; laudanum, 1 dr.; syrup of saffron, 1 oz. Make up 1 pint with caraway water.

Vermifuge Lozenges.—Santonin, 60 grs.; pulverized sugar, 5 oz.; mucilage of gum tragacanth, sufficient to make into a thick paste, worked carefully together, that the santonin shall be evenly mixed throughout the whole mass; then if not in too great a hurry, cover up the mortar in which you have rubbed them, and let stand from 12 to 24 hours to temper; at

which time they will roll out better than if done immediately; divide into 120 lozenges. Dose, for a child 1 year old, 1 lozenge, night and morning; of 2 years, 2 lozenges; of 4 years, 3; of 8 years, 4; of 10 years or more, 5 to 7 lozenges; in all cases to be taken twice daily, and continuing until the worms start on a voyage of discovery.

FUMIGATING PAPER.—Dip light paper in a solution of alum; strength of alum, 1 oz.; water. 1 pt. Dry thoroughly, and on one side spread a mixture of equal parts of gum benzoin, galbanum, or Peruvian balsam; melt the gums in an earthenware dish and spread with a hot spatula; slips of the paper are held over a light, when the odorous matter will be evaporated, the alum preventing the paper from igniting.

IMPERIAL DROPS FOR GRAVEL AND KIDNEY COMPLAINT.—Oil of origanum, 1 oz.; oil of hemlock, ½ oz.; oil of sassafras, ¼ oz.; oil of anise, ½ oz.; alcohol, 1 pint; mix. Dose, from ½ to 1 teaspoonful 3 times a day, in sweetened water, will soon give relief when constant weakness is felt across the small of the back, as well as gravelly affections causing pain about the kidneys.

POSITIVE CURE FOR GONORRHŒA.—Liquor of potass, ½ oz.; bitter apple, ½ oz.; spirits of sweet nitre, ½ oz.; balsam of copaiba, ½ oz.; best gum, ¼ oz. To use, mix with peppermint water; take ½ teaspoonful 3 times per day; cure certain in 9 days.

PAREGORIC.—Best opium, ½ dr.; dissolve in about 2 tablespoonfuls of boiling water; then add benzoic acid ½ dr.; oil of anise, ½ a fluid dr.; clarified honey, 1 oz.; camphor gum, 1 scruple; alcohol, 76 per cent., 11 fluid oz.; distilled water, 4 fluid oz.; macerate (keep warm) for two weeks. Dose for children, 5 to 20 drops; adults, 1 to 2 teaspoonfuls.

COMPOUND EXTRACT BUCHU.—Buchu, in coarse powder, 12 ozs.; alcohol, 3 pts.; water, 6 pts. are sufficient. Treat the leaves by maceration and displacement, first with a portion of the alcohol and then with the remainder mixed with the water, evaporate the resulting liquid with a gentle heat to three pints, and add 2½ lbs. sugar; continue the heat till it is dissolved, and after removing from the fire, add oil of cubebs, oil of juniper; of each 1 fluid dr.; spirits of nitric ether, 12 fluid ozs., previously mixed, stir together.

HARLEM OIL OR WELSH MEDICAMENTUM.—Sublimed or flowers of sulphur and oil of amber, of each 2 oz.; linseed oil 1 lb.; spirits of turpentine sufficient to reduce all to the consistency of thin molasses. Boil the sulphur in the linseed oil until it is dissolved, then add the oil of amber and turpentine. Dose from 15 to 25 drops, morning and evening. Amongst the Welsh and Germans it is extensively used for strengthening the stomach, kidneys, liver, and lungs; for asthma, shortness of breath, cough, inward or outward sores, dropsy, worms, gravel, fevers, palpitation of the heart, giddiness, headache, &c., by taking it internally; and for ulcers, malignant sores, cankers, &c., anointing externally, and wetting linen with it, and applying to burns.

KING OF OILS, FOR NEURALGIA AND RHEUMATISM.—Burning fluid, 1 pt.; oils of cedar, hemlock, sassafras, and origanum, of each 2 oz.; carbonate of ammonia, pulverized, 1 oz.; mix. DIRECTIONS.—Apply freely to the nerve and gums around the tooth; and to the face, in neuralgic pains, by wetting brown paper and laying on the parts, not too long, for fear of blistering; to the nerves of teeth by lint.

BLACK OIL.—Best alcohol, tincture of arnica, British oil, and oil of tar, of each 2 oz.; and *slowly* add sulphuric acid, ½ oz. These black oils are getting into extensive use as a liniment, and are indeed valuable, especially in cases attended with much inflammation.

COMMON CASTOR OIL.—Pale vegetable oil, 1 gal.; castor oil, 3 gals.; mix.

CERATE SIMPLE.—A composition of equal parts of yellow wax and olive oil, used alone as an emollient application to sores, or as a base to compound more active ointments.

PARALYTIC LINIMENT.—Sulphuric ether, 6 oz.; alcohol, 2 oz.; lauda-

num, 1 oz.; oil of lavender, 1 oz.; mix and cork tightly. In a recent case of paralysis let the whole extent of the numb surface be thoroughly bathed and rubbed with this preparation, for several minutes, using the hand, at least three times daily; at the same time take internally, 20 drops of the same, in a little sweetened water.

Nerve and Bone Liniment.—Beef's gall. 1 qt.; alcohol, 1 pt.; volatile liniment, 1 lb.; spirits of turpentine, 1 lb.; oil origanum, 4 oz.; aqua ammonia, 4 oz.; tincture of cayenne, ½ pt.; oil of amber, 3 oz.; tincture Spanish flies, 6 oz.; mix well.

Liniment for Old Sores.—Alcohol, 1 qt.; aqua ammonia, 4 oz.; oil of origanum, 2 oz.; camphor gum, 2 oz.; opium, 2 oz.; gum myrrh, 2 oz.; common salt, two tablespoons. Mix, and shake occasionally for a week.

Liniment for Sprains, Swellings, &c.—Aqua ammonia, spirits camphor, each two ounces; oil origanum and laudanum, each one-half ounce. Mix.

Liniment.—Good Samaritan.—Take 98 per cent. alcohol, 2 qts.; and add to it the following articles: Oils of sassafras, hemlock, spirits of turpentine, tincture of cayenne, catechu, guaiac (guac), and laudanum, of each 1 oz.; tincture of myrrh, 4 oz.; oil of origanum, 2 oz.; oil of wintergreen, ½ oz.; gum camphor, 2 oz.; and chloroform, 1½ oz. This is one of the best applications for internal pains known: it is superior to any other enumerated in this work.

Great Pain-Extractor.—Spirits of ammonia, one ounce; laudanum, one ounce; oil origanum, one ounce; mutton tallow, half ounce; combine the articles with the tallow, when it is nearly cool.

Cough Mixture.—An excellent remedy.—Procure 5 cts. worth of each of the following articles:

Sweet Spirits nitre.
Syrup Squills.
Sweet oil.
Paragoric.

Mix, with ½ gill Molasses or Syrup. For adults one tablespoonful 3 or 4 times a day or even more if the cough is troublesome. For children a proportionate quantity.

Syrups for Soda Fountains, &c.—1. *Simple syrup.* White sugar, 10 lbs; water, 1 gal.; best isinglass, ¼ oz. Dissolve the isinglass in hot water, and add it to the hot syrup. The syrup is to be made with gentle heat and then strained. 2. *Lemon—a*—Grate off the yellow rind of lemons and beat it up with a sufficient quantity of granulated sugar. Express the lemon juice, add to each pt. of juice 1 pt. of water, and 3 lbs. of granulated sugar, including that rubbed with the rind; warm until the sugar is dissolved and strain. 3. *Lemon—b*—Simple syrup 1 gal., oil of lemon 25 drops, citric acid 10 drams. Rub the oil of lemon with the acid, add a small portion of syrup, and mix. 4. *Strawberry—a*—Strawberry juice 1 pt., simple syrup 3 pints, solution of citric acid 2 drams. 5. *Strawberry—b*—Fresh strawberries 5 qts. white sugar 12 lbs., water, 1 pt. Sprinkle some of the sugar over the fruit in layers, and allow the whole to stand for several hours; express the juice and strain, washing out the pulp with water; add the remainder of the sugar and water, bring the fluid to the point of boiling, and then strain. This will keep for a long time. 6. *Raspberry.* Raspberry juice 1 pt., simple syrup 3 pts., citric acid 2 drams. Raspberry syrup may also be made in a way similar to No. 5 for strawberry. 7. *Vanilla.*—Fluid extract of vanilla 1 oz., citric acid, ¾ oz., simple syrup 1 gal. Rub the acid with some of the syrup, add the extract of vanilla, and mix. 8. *Vanilla Cream.*—Fluid extract of vanilla 1 oz., simple syrup 3 pts., cream or condensed milk 1 pt.; may be colored with carmine. 9. *Cream.*—Fresh cream 1 pt., fresh milk 1 pt., powdered sugar 1 lb.; mix by shaking, and keep in a cool place. The addition of a few grains of bicarbonate of soda will for some time retard souring. 10. *Ginger.*—Tincture of ginger 2 fluid ozs. simple syrup 4 pts. 11 *Orange.*—Oil of orange 30 drops, tartaric acid 4 drams, simple syrup 1 gal.

Rub the oil with the acid, and mix. 12. *Pineapple.*—Oil ot pineapple 1 dram, tartaric acid 1 dram, simple syrup 6 pts. 13. *Orgeat.*—Cream syrup 1 pt., vanilla syrup 1 pt., oil of bitter almonds 4 drops. 14. *Nectar.*—Vanilla syrup 5 pts., pineapple syrup 1 pt., strawberry, raspberry or lemon 2 pts. 15. *Sherbet.*—Vanilla syrup 3 pts., pineapple 1 pt., lemon syrup 1 pt. 16. *Grape.*—Brandy ¾ of a pt., spirits of lemon 5 oz., tincture of red sanders 2 ozs., simple syrup 1 gal. 17. *Banana.*—Oil of banana 2 drams, tartaric acid 1 dram, simple syrup 6 pts. 18. *Coffee.*—Coffee roasted ¾ lbs., boiling water 1 gal. Enough is filtered to make about ½ gal. of the infusion, to which add granulated sugar 7 lbs. 19. *Wild Cherry.*—Wild Cherry bark coarse powder, 5 ozs. Moisten the bark with water, and let it stand for 24 hours in a close vessel. Then pack it firmly in a percolator, and pour water upon it until 1 pt. of fluid is obtained. To this add 28 ozs. of sugar. 20. *Wintergreen.*—Oil of wintergreen 25 drops, simple syrup 5 pts., and a sufficient quantity of burnt sugar to color. 21. *Sarsaparilla—a*—Oil wintergreen 10 drops, oil of anise 10 drops, oil of sassafras 10 drops, fluid extract of sarsaparilla 2 ozs., simple syrup 5 pts., powdered extract of licorice 1 oz. 22. *Sarsaparilla—b*—Simple syrup 4 pts., compound syrup of sarsaparilla 4 fluid ozs., caramel 1½ ozs., oil of wintergreen 6 drops, oil of sassafras 6 drops. 23 *Maple.*—Maple sugar 4 lbs., water 2 pts. 24. *Chocolate.*—Best chocolate 8 ozs., water 2 pts., white sugar 4 lbs. Mix the chocolate in water, and stir thoroughly over a slow fire. Strain, and add the sugar. 25. *Coffee Cream.*—Coffee syrup 2 pts., cream 1 pt. 26 *Ambrosia.*—Raspberry syrup 2 pts., vanilla 2 pts., hock wine 4 ozs. 27. *Hock and Claret.*—Hock or claret wine 1 pt., simple syrup 2 pts. 28. *Solferino.*—Brandy 1 pt., simple syrup 2 pts., 29. *Fruit Acid.*—(Used in some of the syrups). Citric acid 4 ozs., water, 8 ozs. Most of the syrups not made from fruits may have a little gum arabic added in order to produce a rich froth.

Soda Syrups.—Loaf or crushed sugar, 8 lbs., pure water, 1 gallon, gum arabic, 2 oz.; mix in a brass or copper kettle. Boil until the gum is dissolved, then skim and strain through white flannel, after which add tartaric acid, 5 oz.; dissolve in hot water; to flavor, use extract of lemon, orange, vanilla, rose, sarsaparilla, strawberry, &c., &c., ½ oz. or to your taste. If you use juice of lemon, add 2½ lbs. of sugar to a pint, you do not need any tartaric acid with it; now use two tablespoonfuls of syrup to ¾ of a tumbler of water, and ¼ teaspoonful of super-carbonate of soda, made fine; drink quick. For soda fountains, 1 oz. of super-carbonate of soda is used to 1 gallon of water. For charged fountains no acids are needed in the syrups.

Lemon Syrup.—Havana sugar, 1 lb., boil in water down to a quart, drop in the white of 1 egg, and strain it. Add ¼ oz. tartaric acid; let it stand 2 days; shake often; 12 drops essence of lemon will much improve it.

Raspberry Syrup without Raspberries.—First make a syrup with 36 lbs. of white sugar, and 10 gallons of water, and put it into a clean mixing barrel. Then dissolve ¼ lb. of tartaric acid in 1 qt. of *cold* water, and add to the syrup. Next take ¼ lb. orris root and pour over it half a gallon of *boiling* water; let it infuse until cold, then filter, and put it into the mixing barrel, stirring it well.

Kissingen Water for Fountains.—Bicarbonate of soda, 1 dr.; carbonate of lime, 2 drs., and 2 scr.; precipitate carbonate of lime, 2 scr.; common salt, 8 ozs.; muriate of ammonia, 4 grs; sulphate of soda, 2 drs. and 2 scr.; sulphate of magnesia, 2 ozs.; phosphate of soda, 13 grs.; phosphate of lime 2 drs. and 2 scr. Mix. Add water ¾ of a gal. Let it stand for 6 hours, filter, add carbonate of magnesia, 3 drs. and 1 scr., and charge with ten gals. of water.

Genuine Seidlitz Powders.—Rochelle salts, 2 drs.; bicarb. soda, 2 scr.; put these into a blue paper, and 35 grains tartaric acid into a white paper. To use, put each into different tumblers, fill ½ with water, adding a little loaf sugar to the acid, then pour together and drink quick.

Vichy Water for Fountains.—Sulphate of potass, 2 drs.; sulphate of soda, 25 grs.; common salt, 6 drs.; bicarbonate of ammonia, 10 grs. Mix.

Add water, 1 gal. Let it stand 1 day, filter and then charge with 10 gals. of water.

Bottled Seidlitz Water.—Fill soda-water bottles with clear water; add to each as below; cork and wire immediately: Rochelle salts, 3 drops; bicarbonate of soda, 35 grs.; sulphuric acid, 11 drops.

Congress Water for Fountains.—Common salt, 7¾ ozs.; hydrate of soda, 20 grs.; bicarbonate of soda, 20 grs.; calcined magnesia, 1 oz. Add to 10 gal. of water, and then charge with gas.

Mineral Water.—Epsom salts, 1 oz.; cream tartar, ½ oz.; tartaric acid, ¼ oz.; loaf sugar, 1 lb.; oil of birch, 20 drops; put 1 qt. cold water on 2 tablespoonfuls yeast (winter green oil will do), let it work 2 hours and then bottle.

Tunbridge Wells Water.—Chloride of sodium, 5 grains; tinct. steel, 20 drops; distilled water, 1½ pints.

Irritating Plaster.—Extensively Used by eclectics.—Tar, 1 lb.; burgundy pitch, ½ oz.; white-pine turpentine, 1 oz.; resin, 2 oz. Boil the tar, resin, and gum together a short time, remove from the fire, and stir in finely pulverized mandrake root, blood root, poke root, and Indian turnip, of each, 1 oz.

Cephalic Snuff.—Take asarabacca leaves, marjoram, light Scotch snuff equal parts; grind and sift, use like common snuff.

Artificial Skin.—For Burns, Bruises, Abrasions, &c.—Proof Against Water.—Take gun cotton and Venice turpentine, equal parts of each, and dissolve them in 20 times as much sulphuric ether, dissolving the cotton first, then adding the turpentine; keep it corked tightly. Water does not affect it, hence its value for cracked nipples, chapped hands, surface bruises, &c., &c.

Rat Exterminator.—Warm water, 1 qt.; lard, 2 lbs.; phosphorus, 1 oz.; mix, and thicken with flour; to be spread on bread and covered with sugar.

Bug Poison.—Alcohol, ½ pint; turpentine, ½ pint; crude sal ammoniac, 1 oz.; mix all together, and let it digest in a warm place for a few days, and it is ready for use.

Sealing-wax, Red.—Shellac (very pale), 4 oz.; cautiously melt in a bright copper pan over a clear charcoal fire; when fused, add Venice turpentine, 1¼ oz. Mix, and further add vermilion 3 oz.; remove the pan from the fire, and pour into a mould. For a *black* color, use ivory black, or lampblack instead of the vermilion; for a *blue* color, use Prussian blue, instead of the vermilion; same quantity. Each color must be well mixed with the composition; of the lampblack use only sufficient to color.

Gold-colored Sealing-wax.—Bleached shellac, 3 lbs.; Venice turpentine 1 lb.; Dutch leaf, ground fine, 1 lb., or less. The leaf should be ground, or powdered sufficiently fine, without being reduced to dust. Mix with a gentle heat, and pour into moulds.

Bottle Wax—Black.—Black resin, 6½ lbs.; beeswax, ½ lb.; finely powdered ivory black, 1½ lbs. Melt together. Red, as the last, but substitute Venetian red, or red lead, for the ivory black.

Liquid Mucilage. Fine clear glue 1 lb.; gum arabic, 10 oz.; water, 1 qt.; melt by heat in a glue kettle or water bath; when entirely melted, add slowly 10 ozs. strong nitric acid, set off to cool. Then bottle, adding in a couple of cloves to each bottle.

Bed-bug Poison.—One ounce of quicksilver beat up with the whites of two eggs, and put on with a feather, is the cleanest and surest method of destroying bedbugs. What remains should be thrown away, as it is exceedingly poisonous.

Eau de Cologne. This favourite perfume may be compounded in a variety of ways; the following are some of the most approved:

1. Oil of neroli, citron, bergamot, orange, and rosemary, 12 drops each; cardamom seeds, 1 drachm; spirits of wine, 1 pint; infuse for a week.

2. Rectified spirits of wine, 4 pints; oil of bergamot, 1 oz.; oil of lemon, ½ oz.; oil of rosemary, ½ drachm; oil of neroli, ¾ drachm; oil of English lavender, 1 drachm; oil of oranges, 1 drachm; mix well and filter.

3. Essence of citron, 2 drachms ; essence of bergamot, 2 drachms ; essence of cedrat, 1 drachm ; essence of lavender, ½ drachm ; essence of orange-flowers, 10 drops ; tincture of musk, ½ drachm ; tincture of benjamin, 3 drachms ; otto of roses, 2 drops ; proof spirit, 2 pints. Mix and filter.

4. (*Farina's*). Infuse in a quart of spirits of wine a piece of benzoin about the size of a filbert, and a drachm and a half of cardamon seed ; when these have stood forty-eight hours, add half an ounce of animal charcoal, shaking the bottle well, and when it has stood for an hour filter it through blotting paper ; when filtered add a drachm and a-half of bergamot, half a drachm of oil of rosemary, two drachms of essence of lemon, half a drachm of oil of lavender, fifteen drops of neroli, and two drops of oil of cloves ; shake these together, and filter again.

Eau de Bouquet.—Take two ounces each of storax, lemon-peel, and nutmeg ; six ounces each of coriander and calamus aromaticus ; one ounce and a half of cloves ; four ounces of iris of Florence ; half an ounce of essence of bergamot ; a drachm of essence of lemon, a drachm of rosemary ; fifteen drops of otto of roses ; a quarter of a drachm of ambergris ; half a drachm of vanilla ; three gallons and a half of spirits of wine ; and a quart of orange-flower water. Bruise all the solid substances, except the amber, the iris, and the vanilla, and infuse them in the spirits of wine for several days ; then distil and add to the product the amber, vanilla, and iris ; infuse them for several days, then filter the mixture, and add the orange-flower water. When used as a cosmetic, this mixture must be greatly diluted with water.

Oil of Roses.—Olive oil, 1 lb. ; otto of roses, 50 drops ; oil of rosemary, 25 drops ; mix. Another, roses (hardly opened) 12 oz.; olive oil, 10 oz., beat them together in a mortar ; let them remain for a few days, then express the oil.

Lisbon Water.—To rectified spirit, 1 gallon, add essential oils of orange peel and lemon peel, of each 3 ounces, and of otto of roses, ¼ ounce.

Balm of a Thousand Flowers.—Deodorized alcohol, 1 pint ; nice white bar soap, 4 oz.; shave the soap when put in, stand in a warm place till dissolved ; then add oil of citronella, 1 drachm, and oils of neroli and rosemary, of each ½ drachm.

Frangipanni.—Spirits, 1 gal. ; oil bergamot, 1 oz. ; oil of lemon, 1 oz. ; macerate for 4 days, frequently shaking ; then add water, 1 gal. ; orange-flower water, 1 pint, essence of vanilla, 2 oz. Mix.

Jockey Club.—Spirits of wine, 5 gals. ; orange-flower water, 1 gal. ; balsam of Peru, 4 oz ; essence of bergamot, 8 oz. ; essence of musk, 8 oz. ; essence of cloves, 4 oz. : essence of neroli, 2 oz.

Extract of Patchouli.—Mix 1¼ oz. ottar of Patchouli, and ¼ oz. otto of rose, with 1 gal. rectified spirits.

Esprit de Bouquet.—Oil of lavender, oil of cloves, and oil of bergamot, each 2 drachms ; otto of rose, and oil of cinnamon, each 20 drops ; essence of musk, 1 drachm ; rectified spirits, 1 pint. Mix.

Balm of Beauty.—Pure soft water, 1 qt. ; pulverized Castile soap, 4 oz.; emulsion of bitter almonds, 6 oz. ; rose and orange flower water, of each, 8 oz. ; tincture of benzoin, 2 drs. ; borax, 1 dr. ; add 5 grs. bichloride of mercury to every 8 oz. of the mixture. To use, apply on a cotton or linen cloth to the face, &c.

Bloom of Youth.—Boil 1 ounce of Brazil wood in 3 pints of water for 15 minutes ; strain. Add ¾ oz. isinglass, ¼ oz. cochineal, 1 oz. alum, ½ oz. borax. Dissolve by heat, and strain.

Hungary Water.—Spirit of rosemary, 4 pints ; orange-flower water, ¼ pint ; essence of neroli, 4 drops.

Phalon's Instantaneous Hair-Dye.—No. 1. To 1. oz. pyrogallic acid, and ¼ oz. of tannia, dissolved in 2 oz. of alcohol, add 1 qt. of soft water. No. 2. To 1 oz. crystallized nitrate of silver, dissolved in 1 oz. concentrated aqua-ammonia, add 1 oz. gum arabic and 14 oz., soft water. Keep in the dark.

Phalon's (One Preparation). To 1 oz. crystallized nitrate of silver, dissolved in 2 oz. of aqua-ammonia, add 5 oz. soft water. This is not an instantaneous dye; but after exposure to the light and air, a dark color is produced upon the surface to which it is applied. Remember to remove all grease, &c., from the hair before applying these dyes.

Christadoro's Hair-Dye.—No. 1. To 1 oz. of pyro-gallic acid, dissolved in 1 oz. alcohol, add 1 qt. soft water. No. 2. To 1 oz. crystallized nitrate of silver, dissolved in 1 oz. concentrated aqua-ammonia and 1 oz. soft water, add ½ oz. gum arabic and 3 oz. soft water. Keep covered from the light.

Batchelor's Hair-Dye. No. 1. To 1 oz. of pyro-gallic acid, dissolved in 1 oz. alcohol, add 1 qt. of soft water. No. 2. To 1 oz. nitrate of silver, dissolved in 1 oz. of concentrated ammonia, add 4 oz. of soft water. Apply each No. alternately, with separate brushes, to the hair.

Harrison's. No. 1. To 1 oz. pyro-gallic acid, 1 oz. of tannin dissolved in 2 oz. alcohol, add 1 qt. soft water. No. 2. To 1 oz. crystallized nitrate of silver, dissolved in 1 oz. of concentrated aqua-ammonia, add 5 oz. soft water and ½ oz. gum arabic. No. 3. 1 oz. hydro-sulphate of potassa, dissolved in 1 qt. of soft water. This last ingredient is intended to produce a deep black color if the others should fail. Keep away from the light.

Professor Wood's. To 8 oz. vinegar, diluted with an equal part of soft water, add 2 drs. sulphur, and 2 drs. sugar of lead.

Mrs. Allen's. To 16 oz. of rose water, diluted with an equal part of salt water, add ½ oz. sulphur and ¼ oz. of sugar of lead; let the compound stand five days before using.

Phalon's Hair Restorative. To 8 oz. of 90 per cent. alcohol, colored by a few drops tincture of alkanet root, add 1 oz. of castor oil, and perfume with a compound of bergamot, neroli, verbena, and orange.

Lyon's Celebrated Kathairon for the Hair—the Original Prescription of the Inventory. Two gallons castor oil, 3 gallons alcohol. Mix first. Ten oz. tincture cauthanile (officinal), 12 oz. bergamot; dissolve in small alcohol. Tincture red sanders,—proportions say 1 lb. to 5 gal., 95 per cent. alcohol—to suit 4 oz. color 30 gallons.

Alpine Hair-Balm. To 16 oz. of soft water add 8 oz. of alcohol and ½ oz. spirits turpentine, ¼ oz. sulphur, and ¼ oz. sugar of lead.

Cold Cream. Take of the oil of almonds two ounces, of spermaceti half an ounce and white wax half an ounce. Put them in a close vessel, and set the vessel in a skillet of boiling water. When melted, beat the ingredients with rosewater until cold. Keep it in a tight box, or wide-mouthed bottle, corked up close.

Pink Saucer. This is employed for imparting an artificial bloom to the cheeks, and may be prepared as follows: Take eight ounces of dried safflower, previously washed in water, until it no longer gives out any color, two ounces of subcarbonate of soda, and two gallons of water. Infuse, and afterwards strain it, add four pounds of French chalk, scraped fine with Dutch rushes, and precipitate the color upon it, with citric or tartaric acid.

Nitrate of Silver. Pure silver, 1½ oz.; nitric acid, 1 oz. diluted with water, 2 oz.; heat by a sand-bath until ebullition ceases, and the water is expelled; then pour into moulds. This substance must be kept from the light.

Glycerine Preparation. New rum, 1 qt.; concentrated spirits of ammonia, 15 drops; glycerine oil, 1 oz.; lac sulphur, 5½ drs.; sugar of lead, 5½ drs.; put the liquor into a bottle, add the ammonia, then the other components. Shake the compound occasionally for four or five days.

Oriental Cold Cream. Oil of almonds, 4 oz.; white wax and spermaceti, of each, 2 drs.; melt, and add rose water, 4 oz.; orange flower water, 1 oz.; used to soften the skin, apply as the last.

Shaving Cream. White wax, spermaceti, almond and oil, of each ¼ oz.; melt, and while warm, beat in 2 squares of Windsor soap previously reduced to a paste with rose water.

Circassian Cream. Take 2 ounces of perfectly fresh suet, either mutton or venison; 3 ounces of olive oil; 1 oz. gum benzoin in powder, and ¼ oz. of alkanet root. Put the whole into a jam jar, which, if without a lid, must be tied over with a bladder, and place the jar in a sauce pan containing boiling water, at the side of the fire. Digest for a whole day, then strain away all that is fluid through fine muslin, and stir till nearly cold. Add, say 1 drachm of essence of almonds, roses, bergamot or any other perfume desired.

Crystalline Cream. Oil of almonds, 8 oz.; spermaceti, 1 oz.; melt together. When a little cooled, add ½ oz. or less of essence of bergamot or other perfume; put into wide-mouthed bottles, and let it stand till cold. *Camphorated* crystalline cream may be made by using camphorated oil. (*Ol. Camphoræ*) instead of oil of almonds.

Macassar Oil. Olive oil, 1 qt.; alcohol, 2½ oz.; rose oil, 1½ oz.; then tie 1 oz. of chipped alkanet root in a muslin bag, and put it in the oil, let it alone for some days till it turns the color of a pretty red, then remove to other oils. Do not press it.

Ox Marrow. Melt 4 oz. ox tallow; white wax, 1 oz.; fresh lard, 6 oz.; when cold, add 1½ oz. oil of bergamot.

Liquid for Forcing the Beard. Cologne, 2 oz.; liquid hartshorn, 1 dr.; tincture cantharides, 2 drs,; oil rosemary, 12 drops; lavender, 12 drops. Apply to the face daily and await results. Said to be reliable.

Clifford's Hair-Dye. No. 1. Pyrogallic acid, 1 oz.; water, 1 qt. No. 2. Nitrate of silver, 1 oz.; water, 4 oz.; ammonia, 1 oz. Keep your materials free from grease, cool, and in the dark. Apply each No. alternately to the hair, first cleaning the hair well.

Pyrogallic Hair-Dye. Pyrogallic acid, ¼ oz.; dissolve it in hot distilled water, 1½ oz.; when the solution cools add gradually rectified spirit, ½ fluid oz.

Fine Shampoo Liquid. Dissolve ½ oz. carbonate of ammonia, and 1 oz. of borax in 1 qt. water, then add 2 oz. glycerine, 3 qts. of New England rum, and 1 qt. of bay rum; moisten the hair with this liquor, shampoo with the hands until a slight lather is formed, then wash off with clean water.

Barber's Shampoo Mixture. Soft water, 1 pint; sal soda, 1 oz.; cream tartar, ¼ oz. Apply thoroughly to the hair.

Hair Invigorator. Bay rum, 2 pints; alcohol, 1 pint; castor oil, 1 oz.; carb. ammonia, ½ oz.; tincture of cantharides, 1 oz. Mix them well. This compound will promote the growth of the hair, and prevent it from falling out.

Sea Foam for Barbers. Alcohol, 4 oz.; castor oil, 1 oz.; ammonia, ½ oz.; water, 1 pint. Dissolve the castor oil and ammonia in the alcohol, then add the alcohol mixture to the water.

Clifford's Shampoo Compound. Mix borax ¾ lb. with salts tartar ¼ lb. and dissolve 1 oz. of the mixture in 1 pint water.

Razor-Strop Paste. Wet the strop with a little sweet oil, and apply a little flour of emery evenly over the surface.

New-York Barbers' Star Hair Oil. Castor oil 6½ pints; alcohol, 1½ pints; citronella and lavender oil, each ½ oz.

Bay Rum. French proof spirit 1 gal.; ext. Bay 6 ozs. Mix and color with caramel, needs no filtering.

Cheap Bay Rum. Saturate a ¼ lb. block of carb. of magnesia with oil of Bay; pulverize the magnesia, place it in a filter, and pour water through it until the desired quantity is obtained, then add alcohol. The quantity of water and alcohol employed depends on the desired strength and quantity of the Bay rum. *Another.* Oil of Bay, 10 fluid drs.; oil of pimento, 1 fluid dr.; acetic ether, 2 fluid drs.; alcohol, 3 gals.; water, 2½ gals. Mix, and after 2 weeks' repose, filter.

Yankee Shaving Soap. Take 3 lbs. white bar soap; 1 lb. Castile soap; 1 quart rain water; ½ pint beef's gall; 1 gill spirits of turpentine. Cut the

soap into thin slices, and boil five minutes after the soap is dissolved, stir while boiling; scent with oil of rose or almonds. If wished to color it, use ½ oz. vermilion.

Chinese Depilatory (*to remove superfluous hair*). Crystallized hydrosulphate of soda, 3 parts; quicklime, in powder, 10 parts; starch, 10 parts. Mix. To be mixed with water, and applied to the skin, and scraped off in 2 or 3 minutes, with a wooden knife.

2. Quicklime, 16 ounces; pearlash, 2 ounces; reduce to fine powder and keep in a close bottle. Use as above.

Perfumed Powder for Boxes and Drawers. Coriander powder, Florentine orris powder, powdered rose leaves, powdered sweet-scented flag-root, of each 2 ounces: lavender flowers, powdered, 4 ounces; musk, 1 scruple; powder of sandalwood, 1 drachm. Mix.

Scott's Wash to Whiten the Nails. Tincture of myrrh, one dr.; diluted sulphuric acid, two drachms; spring water, four ounces. Mix. Cleanse the nails with white soap, then dip into the wash.

To Whiten the Hands. Take two cakes of brown Windsor soap, scrape to a powder, and add Eau de Cologne, two ounces; lemon juice, two ounces; mix well and form into cakes. This is an excellent soap to make the hands soft and white.

Excellent Tooth Powder. Suds of castile soap and spirits of camphor, of each an equal quantity; thicken with equal quantities of pulverized chalk and charcoal to a thick paste. Apply with finger or brush.

To Remove Pimples. Take white vinegar, four ounces; sulphur water, two ounces; acetated liquor of ammonia, one-half ounce; liquor of potassa, two grains; distilled water, four ounces. Mix, and apply twice a day.

To Clean Hair Brushes. Melt a piece of common soda in hot water, and put it in a large basin, and when nearly cold, dip your brush in, with the back upward (do not let the water get over the back;) shake it in the water till it becomes clean, then pour cold water over the back; take it out of the water, shake as dry as you can, and then let it dry in the air without any rubbing with a cloth, which spoils the bristles.

Paste for Chapped Hands, and which will Preserve them Smooth by constant use. Mix a quarter of a pound of unsalted hog's lard, which has been washed in common, and then in rose-water, with the yolks of two new-laid eggs, and a large spoonful of honey. Add as much fine oatmeal, or almond-paste, as will work into a paste.

Alloys for Dentists' Moulds and Dies. 1. *Tin, very hard.* Tin, 16 parts; antimony, 1 part; zinc, 1 part; 2. *Tin, softer than the last.* Tin, 8 parts; zinc, 1 part; antimony, 1 part; 3. *Copper Alloy, very hard.* Tin, 12 parts; antimony, 2 parts; copper, 1 part; 4. *Cadmium Alloy, about the hardness of zinc.* Tin, 10 parts; antimony, 1 part; cadmium, 1 part.

Base for Artificial Teeth. Proportions. India-rubber, 1 lb.; sulphur, ½ lb.; vermilion, 1 lb. 4 oz.

Dentists' Emery Wheels. Emery, 4 lbs.; shellac, ½ lb.; melt the shellac over a slow fire; stir in the emery, and pour into a mould of plaster of Paris. When cold it is ready for use.

Dentists' Composition for Filling Decayed Teeth. Gold, 1 part; mercury, 8 parts; incorporated by heating together; when mixed pour them into cold water. Or, tinfoil and quicksilver; melt together in a convenient vessel, take a small quantity, knead it in the palm of the hand, and apply quick. Or, mix a little finely-powdered glass with some mineral succedaneum; apply as usual. Or, take some mineral succedaneum, and add some steel dust. Or, mineral succedaneum mixed with levigated porcelain or china. Or, gypsum, 1 part; levigated porcelain, 1 part; levigated iron filings, 1 part; make into a paste with equal parts of quick-drying copal and mastic varnish. Or, quicksilver, 40 grains; steel filings, 26 grains. Or, silver, 72 parts; tin, 20 parts; zinc, 6 parts. Better than any, pure gold, 1 part; silver, 3 parts; tin, 2 parts; melt the first two, add the tin, reduce all to a fine powder, use with an equal quantity of pure mercury.

Gutta-percha, softened by heat, is recommended. Dr. Rollfs advises melting a piece of caoutchouc at the end of a wire, and introducing it while warm.

Amalgams for the teeth are made with gold or silver, and quicksilver, the excess of the latter being squeezed out, and the stiff amalgam used warm. Inferior kinds are made with quicksilver and tin, or zinc. A popular nostrum of this kind consists of 40 grains of quicksilver and 20 of fine zinc filings, mixed at the time of using. The following is said to be the most lasting and least objectionable amalgam : Melt 2 parts of tin with 1 of cadmium, run it into an ingot, and reduce it to filings. Form these into a fluid amalgam with mercury, and squeeze out the excess of mercury through leather. Work up the solid residue in the hand, and press it into the tooth. Another cement consists of about 73 parts of silver, 21 of tin, and 6 of zinc, amalgamated with quicksilver. Beyond all doubt, gold foil is the best filling in use.

A sure cure for pain in a hollow tooth is a mixture of powdered alum and common salt, applied with a lock of cotton wool. A sensation of coldness follows the application, after which the pain gradually subsides.

Dentists' Nerve Paste.—Arsenic, 1 part; rose pink, 2 parts. To destroy the nerve, apply this preparation on a pledget of cotton, previously moistened with creosote, to the cavity of the tooth, let it remain 4 hours, then wash out thoroughly with water. *Another.* Arsenious acid, 30 grs. ; acetate of morphia, 20 grs. ; creosote, q. s. for paste. Mix.

Wash for the Teeth. Dissolve two ounces of borax in three pints of warm water. Before the water is quite cold add one teaspoonful of tincture of myrrh and one table-spoonful of spirits of camphor. Bottle the mixture for use. One wine-glassful of the mixture added to half a pint of tepid water is sufficient for each application. This solution used daily beautifies and preserves the teeth.

Nitrous Oxide, or Laughing Gas.—Take two or three ounces of nitrate of ammonia in crystals and put it into a retort, taking care that the heat does not exceed 500° ; when the crystals begin to melt, the gas will be produced in considerable quantities. The gas may also be procured, though not so pure, by pouring nitric acid, diluted with five or six times its weight of water, on copper filings or small pieces of tin. The gas is given out till the acid begins to turn brown; the process must then be stopped.

To Inhale the Laughing Gas.—Procure an oiled or varnished silk bag, or a bladder, furnished with a stop-cock, into the mouth, and at the same time hold the nostrils, and the sensation produced will be of a highly pleasing nature ; a great propensity to laughter, a rapid flow of vivid ideas, and an unusual fitness for muscular exertion, are the ordinary feelings which it produces. The sensations, produced by breathing this gas, are not the same in all persons, but they are of an agreeable nature, and not followed by any depression of spirits like those occasioned by fermented liquors.

Poudre Metallique.—The article sold under this name in Paris appears to be an amalgam of silver, mercury, and ammonium, with an excess of mercury, which is pressed out before using it.

Certain Remedy for Offensive Breath.—Take from six to ten drops of Labarraque's solution of chloride soda (can be purchased at any drug store) and put it in a wine-glassful of pure water. Taken immediately after the operations of the morning are completed, this will instantly sweeten the breath by disinfecting the stomach, which far from being impaired, will be benefited by the medicine. If necessary, the dose may be repeated in the middle of the day. In some cases the odor arising from carious teeth is combined with that of the stomach ; if the mouth be well rinsed with a teaspoonful of the solution in a tumblerful of water, the bad odor of the teeth will be removed.

To Extract Teeth with Little or no Pain.—Tincture of aconite, chloroform, and alcohol, of each 1 oz. ; mix ; moisten two pledgets of cotton

with the liquid, and apply to the gums on each side of the tooth to be extracted, holding them in their place with pliers or other instruments for from five to ten minutes, rubbing the gum freely inside and out.

THE TREATMENT OF INFANTS.

Would that parents generally were aware of the importance, and adequately understood the principles of properly taking care of children. One-half of the diseases of mature life have their origin in our early years.

In the following treatise may be found a complete code of precepts for the bringing up of children. It is from the highest medical authority, and I cannot too highly commend it to the attention of all parents, and all those who ever expect to become such.

Rules for Treatment of the Child after Birth and before Weaning.

Give the breast within twelve or eighteen hours after birth, at least.

Foment the breast with warm water if the milk does not flow ; avoid rubbing the breasts with spirits.

If there be too much milk, drink little, and take opening medicine.

As a nurse, wear easy dresses about the bosom and chest.

Keep down the tendency of the abdomen to enlarge, by exercise.

If the nipple is small or turned in, have it drawn by an older or stronger infant, not by artificial means; but let the new-born child have the first milk.

Choose a hired wet nurse [when required] nearly of the same age with the mother, like her in constitutional peculiarities, and who has been confined about the same time.

When nursing, live on nutritious but not heavy diet. A full habit requires less nutriment than a delicate constitution. Stimulating liquors are to be avoided. Simple diluents, such as tea, are quite enough as drinks for many mothers.

The mother's milk is the best food for the new-born child for three months.

An infant from two to four months old requires to be suckled once about every three hours.

The best substitute for the breast, but as temporary as possible, is asses' or diluted cows' milk ; but on no account should farinaceous food be given at this early period.

Apply a flannel bandage to the lower part of the body in bowel complaints. A warm bath soothes irritation.

After six months an approach may be made to more solid diet.

Raise up the child after feeding.

Give no stimulants, caraway-seeds, carminatives, &c.; they are most pernicious.

Give as little medicine to a child as possible, and always by advice.

Never over-feed, and never stop crying by feeding.

Avoid rough jolting and patting of the back.

Train an infant to regularity in all its wants.

Rules for Weaning.

Wean gradually, discontinuing suckling in the night ; the gradual change is beneficial to both mother and child. Avoid weaning in severe weather. Take for yourself a cooling purgative, and refrain from fluids and stimulating diet.

In weaning, apply to the breasts three ounces compound soap liniment, three drachms laudanum, one drachm camphor liniment. If this be too

irritating, foment with warm water, or poppy-heads and camomile flowers boiled together in water. Avoid tightness or pressure from the dress, and all roughness, for fear of abscess. Avoid drawing the breasts; avoid exposure to cold.

Rules for Treatment after Weaning—Food.

Study the child's constitution, digestive powers, teeth, strength, and proportion the kind and quantity of food.

Animal food, in small quantity, once a day, if the teeth can masticate, is necessary when there is rapid growth.

Avoid too nourishing a diet with a violent tempered child.

Give a nourishing diet to a white-looking, lymphatic child.

Both over-feeding and under-feeding produces scrofula and consumption.

The spoiled and petted child is injured both in health and temper.

Avoid seasoned dishes, fried and salted meats, pastry, uncooked vegetables, unripe fruits, wine and rich cake.

Insist on thorough chewing or mastication.

Never tempt the appetite when disinclined.

Vary the food from day to day, but avoid variety at one meal.

Animal food should be tender, and eaten with a little salt, vegetables, and bread.

Take care that the child's food is well cooked. Give no new bread.

Sweetmeats and confections are only to be given to children in a very sparing manner, if given at all. Never pamper or reward with eatables.

Rules for Sleep.

Allow the child plenty of sleep, without disturbance.

Avoid accustoming the child to sleep on the lap; it will not sleep in bed if so accustomed.

Establish times for regular sleeping.

Keep the hands, feet and face comfortably warm—blankets are better than sheets.

Support every part of the body, raising by a slope the head and shoulders.

Avoid laying the child in the same bed with an adult, unless for a short time, to restore warmth if it fail.

Never rouse the child by play when taken up during the night.

Rules for Clothing.

In the first stage of infancy, warmth depends on clothing alone, for there is no muscular movement.

Avoid a degree of warmth which produces *sensible* perspiration.

Flannel and calico are the best materials in all seasons.

Dress the child loosely, and fasten with strings, not with pins.

The umbilical cord, navel, and belly-band require much attention.

Avoid keeping the child's head too warm, or its feet too cold.

Avoid chilling the child, or taking it abroad in cold weather.

Attend to the form and size of the child's shoes, so that the feet shall not be cramped.

The practice of plunging infants into cold water, to render them hardy, is exceedingly dangerous.

Let a child's washing be very completely and carefully performed. Keep the child always perfectly clean and neat.

Be very attentive to ventilate the apartment where a child lives, but never expose it to draughts of air.

Begin early to form habits of personal cleanliness and delicacy.

Vaccination.

Let the child be vaccinated from six weeks to two months after birth,

and that by a proper medical attendant. Vaccination should take place before teething.

Deformities and Distortions.

Consult the surgeon upon the first appearance of any deformity; and do not let fears for giving pain to the child prevent the use of the necessary remedies.

Be very vigilant with rickets or soft bones. Never allow the rickety child to support its own weight. It ought to be kept on its back for many months, and carried about on a little mattress on a board or tray, and have nourishing diet, and the proper medicines to give solidity to the bones.

Never jerk or swing children by the arms; much mischief has been done by this practice.

When a child falls, or meets with any accident, it is highly culpable in a nurse to conceal it. If she do not immediately mention it, she may be the cause of the child's deformity and lameness for life.

With proper attention, a tendency to be *left-handed* may be easily cured in a child.

Prevent all tricks and ill habits which injure the features and organs; such as stuffing the nostrils, ears, &c., distending the mouth with too large a spoon.

Curvature of the spine is of very frequent occurrence from mismanaging children, by tight lacing, long sitting without support to the back (all school seats and forms should have backs). Take all deformities of the spine in time, before they get fixed.

Precocity.

When a child appears to be over intelligent, or too *clever* or *wise* for its age, this is a symptom of an unnatural development of the brain; it is a kind of disease. Avoid, therefore, exercising the child's ability; treat it as an animal, with nutritive food, muscular, out-door exercise, and plenty of sleep; and do this, and *this* only, for some years.

No child should be kept for more than a few minutes at a time engaged in mental study.

Stammering and Defective Articulation.

This defect, with care, may be cured; or rather, when it is first threatened, it may be prevented. Practice the child in letters or articulations where a peculiar defect appears.

Squinting.

Watch this very common weakness; check it in the infant by holding the hand over the eyes till they are shut; and when opened again, if they have not assumed a proper position, repeat the operation. It may have often to be repeated. Careless nurses are very apt to *produce* squinting in children.

An ingenious and effectual mode of curing squinting has been discovered, and is now practised by surgeons.

Teething.

The first sign of teething is heat in the mouth of the child, felt by the mother during sucking, flow of saliva, biting and grinding the gums. A piece of India rubber is better than coral, ivory, or any hard substance for rubbing the gums.

When the child is much distressed, have recourse to medical aid.

When the bowels are confined, give without delay a gentle purgative, such as castor-oil, manna, magnesia, or senna. The warm bath at ninety-six degrees soothes the child.

A child's mouth should be often examined, even after three years of age. Wayward temper, cough, and even croup, have been traced to cutting a double tooth.

Do not hesitate to allow the child's gums to be lanced.

Exercise—Walking Alone.

Very little motion, and that of the gentlest and most careful kind, is all the infant should have for a considerable time after birth.

Avoid the upright posture as much as possible.

Avoid all sudden and violent jerking, and long-continued positions.

Allow the child to move its limbs freely, on the floor or in bed.

Watch the first efforts of the child to walk alone, and interfere rather with eye and hand than by exclamations of caution and alarm: these last do much harm.

Avoid sympathizing too strongly with a child when hurt. Assist quietly, and show how the accident happened. Children who are angry when hurt, should see that you do not sympathize with their rage, although you do with their sufferings.

Abjure all leading strings and go-carts, or other artificial means of teaching the child to walk. Never drag the child by one hand, or lift it by either one or both arms.

When the child walks alone, it should not be permitted to over-fatigue itself.

The mother should have her eye both on child and its attendant out of doors, and be as much as she can in her child's company.

Moral Government.

Anticipate and prevent fretfulness and ill temper by keeping the child in good health, ease, and comfort. Never quiet with giving to eat, or by bribing in any way, still less by opiates.

For the first few months, avoid loud and harsh sounds in the hearing of children, or violent lights in their sight. Address them in soft tones; do nothing to frighten them; and never jerk or roughly handle them.

Avoid angry words and violence, both to a child and in its presence; by which means a naturally violent child may be trained to gentleness.

Moderate any propensity of a child, such as anger, violence, greediness for food, cunning, &c., which appears too active. Show him no example of these.

Let the mother be, and let her select servants such as she wishes the child to be. The youngest child is affected by the conduct of those in whose arms he lives.

Cultivate and express benevolence and cheerfulness; in such an atmosphere, a child must become benevolent and cheerful.

Let a mother *feel as she ought*, and she will *look as she feels*. Much of a child's earliest moral training is by looks and gestures.

When necessary, exhibit firmness and authority, always with perfect temper, composure and self-possession.

Never give the child that which it cries for; and avoid being too ready in answering children's demands, else they become impatient of refusal, and selfish.

When the child is most violent, the mother should be most calm and silent. Out-screaming a screaming child is as useless as it is mischievous. Steady denial of the object screamed for is the best cure for screaming.

In such contests, witnesses should withdraw, and leave mother and child alone. A child is very ready to look round and attract the aid of *foreign* sympathy in its little rebellions.

Never promise to give when the child leaves off crying. Let the crying be the reason for *not* giving.

Never strike a child, and never teach it to strike again. Never tell a child to beat or threaten any animal or object. Corporal correction may be avoided by substitutes.

Nurse, for Children.—For this office there are two kinds of nurses, the wet nurse and the dry nurse. *The wet nurse* acts as a substitute for the mother, or aids her when there is a deficiency in the maternal supply of milk. When a wet nurse is required, the selection should be left to the

medical attendant. The following are deemed sure characteristics of a good nurse: She should be between twenty-five and thirty years of age, strong in constitution, full-chested, of sanguine lymphatic temperament, brown haired, with perfect and white teeth, and full red lips. The milk drawn into a spoon should be white, with a slight bluish tint, its taste saccharine, and its consistence not too thick. In addition to the physical qualifications of a wet nurse, her mental capacity and moral deportment should also be regarded. Her temper and disposition have much to do with the healthy nurture of the child, for it is well known that mental emotions are apt to affect the milk, and so act upon its properties as to render it pernicious to the child. Temperance in eating and drinking, is another important qualification; the latter especially, for when a nurse is addicted to an immoderate use of stimulants, the greatest injury is likely to be inflicted on the suckling infant. The offices of a wet nurse should be made available only where a positive necessity exists. The suckling of the child is the natural office of the mother, and while it does not injure the parent is calculated to be of the greatest benefit to the infant. It should also be borne in mind, that the child will naturally place its affections where it receives its sustenance, and will love the nurse in preference to the mother; and although this may in time wear off, the estrangement while it lasts causes great pain to a mother's heart. *The dry nurse* is a person who brings up a child by hand when the mother is incapable of suckling her child, and a wet nurse cannot be substituted. As the person thus selected is generally removed out of the mother's reach, great care should be exercised in making the selection. A sensible, kind, and patient person, who possesses some knowledge of the natures and habits of children is indispensable; and the person most likely to possess these qualities, is one who has had children of her own. When parents thus intrust their children into the hands of a dry nurse, it would be well if they paid them a visit from time to time, quietly and unexpectedly; for it is sometimes the case, that children thus situated are neglected, save at such times when a visit from the parents or friends is expected.

Feeding Bottle.—A substitute for the breast, by which sustenance is administered to infants. These bottles are made of a convenient form, having in the centre an aperture through which the food is poured, while at the mouth of the bottle the teat is fastened on for the infant to suck from. The best kind of teat is that made of calf's teat, and usually sold by surgeons; others are made of caoutchouc, but these are not to be recommended, as their hard surface frequently irritates the gums of the infant and prevents him from sucking; the calf's teat is decidedly the best, being soft and pleasant, and more nearly resembling the human breast than any other. Great care, however, is necessary in using them, as they soon turn sour; immediately, therefore, the child is fed, the teat should be thrown into a tumbler about half full of cold water, with a wineglassful of gin in it, this will counteract any tendency to acidity, and the teat should remain in the glass until it is again required; after a time it becomes very hard and tough, and should then be exchanged for a new one. The bottle itself should be attended to with the most scrupulous attention; it should be rinsed out every time it has been fed from, and the food should not be suffered to remain in it and again offered to the child. If these matters are neglected, the infant's stomach, by being subjected to the stale food, becomes deranged, and his whole system disordered from a mere act of inattention and carelessness. In holding the bottle, it should be slightly elevated in the direction of the infant's mouth, and the hole in the centre of the bottle should be partially covered with a cork, in such a manner that the infant may not suck in the wind, and yet not to render it air-tight, and so preventing him obtaining any food.

Age at which Menstruation Commences.—Dr. Walter Rigden gives the subjoined statistics, obtained from females who were confined at University College Hospital. In 2,696 cases menstruation occurred for the first time:

At the age of		At the age of	
9 in	3 cases.	18 in	150 cases
10 "	14 "	19 "	76 "
11 "	60 "	20 "	29 "
12 "	170 "	21 "	7 "
13 "	353 "	22 "	3 "
14 "	560 "	23 "	2 "
15 "	540 "	24 "	0 "
16 "	455 "	25 "	0 "
17 "	272 "	26 "	2 "

It thus appears that it is most common at 14 years of age, and great care should be taken of the health on the occurrence of these important periods.

Anodyne for Painful Menstruation.—Extract of stramonium and sulphate of quinine, each sixteen grains; macrotin, eight grains; morcratin, eight grains; morphine, 1 grain; make into eight pills. Dose, one pill, repeating once or twice only, forty to fifty minutes apart, if the pain does not subside before this time. Pain *must* subside under the use of this pill, and costiveness is not increased.

Powder for Excessive Flooding.—Gums kino and catechu, each one grain; sugar of lead and alum, each one-half drachm; pulverize all and thoroughly mix, then divide into seven to ten grain powders. Dose, one every two or three hours until checked, then less often merely to control the flow.

Injection for Leucorrhœa.—When the glairy mucous discharge is present, prepare a tea of hemlock inner bark and witch hazel (often called spotted alder) leaves and bark, have a female syringe large enough to fill the vagina, and inject the tea, twice daily; and occasionally in bad cases, say twice a week, inject a syringe of the following composition: *For Chronic Female Complaints:* White vitriol and sugar of lead, each one-eighth of an ounce; common salt, pulverized alum, and loaf sugar, each one-half drachm; soft water, one pint. Inject as above.

For Prolapsus Uteri, or Falling of the Womb.—Not only the cheapest but the best support will be found to be a piece of fine firm sponge, cut to a proper size, to admit when damp of being pressed up the vagina to hold the womb in its place. The sponge should have a stout piece of small cord sewed two or three times through its centre, up and down, and left sufficiently long to allow its being taken hold of to remove the sponge, once a day, or every other day at the farthest, for the purpose of washing, cleaning, and using the necessary injections; and this must be done while the patient is lying down, to prevent the womb from again falling or prolapsing. After having injected some of the above tea, wet the sponge in the same, and introduce it sufficiently high to hold the womb in its place. If pain is felt about the head, back or loins for a few days before the menses appear, prepare and use the following: *Emmenagogue Tincture:* Alcohol, one pint; red oxide of iron, one ounce; oils of juniper and savin, each one-quarter ounce; oil of tansy, one drachm; tincture of ergot, three drachms; tincture Spanish flies, one-half ounce; mix all, and shake when taken. Dose, one teaspoonful three times daily, to be taken in mucilage of slippery elm or gum arabic, and drink freely of the mucilage also through the day, or use the following:

Emmenagogue Pill.—Precipitated carbonate of iron and gum myrrh, of each 2 drachms; aloes and tincture of Spanish flies, of each one drachm; and oil of savin, 1 drachm; all to be pulverized and made into 100 pills by using thick gum solution. Dose, one pill from one to three times daily, but not to move the bowels too much.

Pills to Promote Menstrual Secretion.—Take pills of aloes and myrrh, four drachms; compound iron pills, 280 grains; mix and form into 100 pills. Dose, two twice a day.

For Obstructed Menstruation.—Make a strong tea of smart weed, covering it to retain the strength, or use the extract of smart weed instead,

taking one teaspoonful of the latter once every three hours (or about ten teaspoonfuls of the tea) in warm water, sweetened, making free use of hot baths for the feet and the lower parts of the body. It will give great relief.

Injection for Obstructed Menstruation.—Mix 1 to 2 fluid drs. liquor of ammonia with 1 pint milk. Use thrice daily.

For Obstructed Menstruation.—Sulphate of iron, 60 grs.; potassa (sub. carb.) 60 grs.; myrrh, 2 drs.; make them into 3½ gr. pills; 2 to be taken three times a day in the absence of fever. *For Painful Menstruation,* take pulv. rhei., 2 drs.; pulv. jalap, 2 drs.; syrup of poppies to mix. Divide into 200 pills, and take night and morning. *To Check Immoderate Flow:* Tinct. of ergot, 1 oz.; liquor of ammonia, 3 drs.; mix. Dose, teaspoonful in water 3 times a day.

Stimulant.—In Low Fevers, and after Uterine Hæmorrhages.—Best brandy and cinnamon water, of each 4 fluid oz.; the yolks of 2 eggs well beaten; loaf sugar, ½ oz.; oil of cinnamon, 2 drops; mix. Dose, from ½ to 1 (fluid) oz., as often as required. This makes both meat and drink. Of course, any other flavoring oils can be used, if preferred, in place of the cinnamon.

For Female Complaints.—One of the best laxative pills for female complaints is macrotin and rhubarb, each 10 grs.; extract of hyoscyamus 10 grs.; Castile soap, 40 grs.; scrape the soap, and mix well together, forming into common sized pills with gum solution. Dose, 1 pill at bed time, or sufficiently often to keep the bowels in a laxative state.

Uterine Hæmorrhage.—Unfailing cure. Sugar of lead, 10 grs.; ergot, 10 grs.; opium, 3 grs.; ipecac., 1 gr.; all pulverized and well mixed. Dose, 10 to 12 grs, given in a little honey or syrup.

In very bad cases after childbirth, it might be repeated in 30 minutes, or the dose increased to 15 or 18 grs.; but in cases of rather profuse wasting, repeat it once at the end of 3 hours, or as the urgency of the case may require.

In every case of female debility make a liberal use of iron, as the want of iron in the system is often the cause of the trouble. Mix fine iron filings with as much ground ginger. Dose, half a teaspoonful 3 three times daily in a little honey or molasses, increasing or lessening the dose to produce a blackness of the stools. Continue this course until well.

Ablution.—The frequent affusion of the surface of the body is not only necessary to cleanliness and comfort, but is also essential to the preservation of health. The explanation of this is, that the pores of the skin act as agents for removing from the body useless and superfluous matter, which is constantly being generated, and which, in the form of minute scales, is deposited upon the outer portion or cuticle of the skin. If this refuse is suffered to accumulate and remain, it forms in the process of time a thick hard crust, which obstructs the pores of the skin, and impedes their functions. It is obvious, therefore, that the internal organs of the body, being deprived of the assistance and vital energy rendered by the pores, become by this means enfeebled in their operations, and habitually debilitated and deranged. To obviate these evil effects, it is necessary that the whole surface of the body should be *daily* subjected to an ablution of cold water, or, where this may be impracticable, to friction with a damp cloth.

Anscess.—A collection of pus or matter deposited in a cavity, occasioned by inflammation. The mode of treatment for the cure of abscess is, to promote suppuration rather than retard it; this is effected by warm fomentations, and poultices of bread and water or linseed meal. If the suppuration proceeds slowly it may be hastened by opening with a lancet, and after the discharge of matter, the poultices may be continued until all tenderness has left the part. The wound should then be dressed with spermaceti ointment twice a day, and lightly bandaged. In the early stages a liberal diet may be adopted, until the period of discharge; a light nutritious diet should then be substituted, and mild aperients administered, until perfect health is restored.

GROCERS, SOAP CHANDLERS, TOBACCONISTS, &c.

The Adulteration of Teas, Coffees, Sugars, Manufacturing Receipts, Tables, &c.

Rapid Process of Marking Goods at any desired per cent. Profit.—Retail merchants, in buying goods by wholesale, buy a great many articles by the dozen, such as boots and shoes, hats and caps, and notions of various kinds; now, the merchant, in buying, for instance, a dozen hats, knows exactly what one of these hats will retail for in the market where he deals; and, unless he is a good accountant, it will often take him some time to determine whether he can afford to purchase the dozen hats and make a living profit by selling them by the single hat; and in buying his goods by auction, as the merchant often does, he has not time to make the calculation before the goods are bid off. He therefore loses the chance of making good bargains by being afraid to bid at random, or if he bids, and the goods are cried off, he may have made a poor bargain, by bidding thus at a venture. It then becomes a useful and practical problem to determine *instantly* what per cent. he would gain if he retailed the hat at a certain price, to tell what an article should retail for to make a profit of 20 per cent.

Rule.—*Divide what the articles cost per dozen by* 10, *which is done by removing the decimal point one place to the left.*

For instance, if hats cost $17.50 per dozen, remove the decimal point one place to the left, making $1.75, what they should be sold for apiece to gain 20 per cent. on the cost. If they cost $31.00 per dozen, they should be sold at $3.10 apiece, etc. We take 20 per cent. as the basis for the following reasons, viz: because we can determine instantly, by simply removing the decimal point, without changing a figure, and, if the goods would not bring at least 20 per cent. profit in the home market, the merchant could not afford to purchase, and would look for cheaper goods.

The reason for the above rule is obvious, for if we divide the cost of a dozen by 12, we have the cost of a single article; then if we wish to make 20 per cent. on the cost (cost being 1-1 or 5-5), we add the per cent., which is 1-5, to the 5-5, making 6-5 or 12-10; then as we multiply the cost, divided by 12, by the 12-10 to find at what price one must be sold to gain 20 per cent., it is evident that the 12s will cancel and leave the cost of a dozen to be divided by 10, to do this remove the decimal point one place to the left.

Now, as removing the decimal point one place to the left, on the cost of a dozen articles, gives the selling price of a single one with 20 per cent. added to the cost, and as the cost of any article is 100 per cent., it is obvious that the selling price would be 20 per cent. more, or 120 per cent.; hence, to find 50 per cent. profit which would make the selling price 150 per cent.,

we would first find 120 per cent. then add 30 per cent. by increasing it one-fourth itself; for 35 per cent., increase it one-eighth itself, etc. Hence to mark an article at any per cent. profit we find the following:

General Rule.—*First find* 20 *per cent. profit by removing the decimal point one place to the left on the price the articles cost per doz. ; then, as* 20 *per cent. profit is* 120 *per cent., add to or subtract from this amount the fractional part that the required per cent. added to* 100 *is more or less than* 120.

Merchants, in marking goods, generally take a per cent. that is an aliquot part of 100, as 25, 33 1-3, 50, &c. The reason they do this is because it makes it much easier to add such a per cent. to the cost ; for instance, a merchant could mark almost a dozen articles at 50 per cent. profit in the time it would take him to mark one at 49 per cent. The following is arranged for the convenience of business men in marking the prices of all articles bought by the dozen.

To make 20 per cent. remove the point one place to the left.

"	80	"	"	"	"	and add	¼ itself.
"	60	"	"	"	"	"	1-3 "
"	50	"	"	"	"	"	1-4 "
"	44	"	"	"	"	"	1-5 "
"	40	"	"	"	"	"	1-6 "
"	37	"	"	"	"	"	1-7 "
"	35	"	"	"	"	"	1-8 "
"	33 1-3	"	"	"	"	"	1-9 "
"	32	"	"	"	"	"	1-10 "
"	30	"	"	"	"	"	1-12 "
"	28	"	"	"	"	"	1-15 "
"	26	"	"	"	"	"	1-20 "
"	25	"	"	"	"	"	1-24 "
"	12 1-2	"	"	"	"	subtract	1-16 "
"	16 2-3	"	"	"	"	"	1-36 "
"	18 3-4	"	"	"	"	"	1-96 "

If I buy a doz. shirts for $28.00, what shall I retail them for to make 50 per cent.? Ans. $3.50.

Explanation.—Remove the point one place to the left, and add ½ itself.

Aliquot Parts of 100 and 1000.—Merchants in selling goods generally make the price of the article some aliquot part of 100, as in selling sugar at 12½ cents per lb., or 8 lbs. for $1.00, or in selling calico for 16 2-3 cents per yard, or 6 yds. for $1.00, etc. The following table will be found valuable for all such calculations:

12½ is 1-8 part of 100
25 is 1-4 part of 100.
37½ is 3-8 part of 100.
50 is 4-8 or ½ of 100.
62½ 5-8 part of 100.
75 is 6-8 or 3-4 part of 100.
87½ is 7-8 part of 100.
6¼ is 1-16 part of 100.
18¾ is 3-16 part of 100.
31¼ is 5-16 part of 100.
8⅓ is 1-12 part of 100.
16 2-3 is 2-12 or 1-6 of 100.
33 1-3 is 4-12 or 1-3 of 100.
66 2-3 is 8-12 or 2-3 of 100.
83 1-3 is 10-12 or 5-6 of 100.
125 is 1-8 part of 1000.
250 is 2-8 or ¼ of 1000.
375 is 3-8 part of 1000.
625 is 5-8 part of 1000.
875 is 7-8 part of 1000.

To multiply by an aliquot part of 100.

Rule.—Add two ciphers to the multiplicand, then take such part of it as the multiplier is part of 100.

If the multiplicand is a mixed number reduce the fraction to a decimal of two places before dividing.

Teas.—The names of the different kinds of tea relate to the time of their being gathered, or to some peculiarity in their manufacture. It is a general rule, that all tea is fine in proportion to the tenderness and immaturity of the leaves. The quality and value of the different kinds diminish as they are gathered later in the season.

Black Teas.—As soon as the leaf-bud begins to expand, it is gathered to make *Pekoe*. A few days' later growth produces black-leaved Pekoe. The next picking is called *Souchong;* as the leaves grow larger and more mature, they form *Congou;* and the last picking is *Bohea*. *Bohea* is called by the Chinese, *Ta-Cha* (large tea), on account of the maturity and size of the leaves; it contains a larger proportion of woody fibre than other teas, and its infusion is of a darker color and coarser flavor. *Congou*, the next higher kind, is named from a corruption of the Chinese *Koong-foa* (great care, or assiduity). This forms the bulk of the black tea imported, and is mostly valued for its strength.

Souchong—Seaoa-choong (small scarce sort), is the finest of the strongest black tea, with a leaf that is generally entire and curly. It is much esteemed for its fragrance and fine flavor. *Pekoe* is a corruption of the Canton name, *Pak-ho* (white down), being the first sprout of the leaf-buds; they are covered with a white silky down. It is a delicate tea, rather deficient in strength, and is principally used for flavoring other teas.

Green Teas.—The following are the principal kinds, *Twankay, Hyson-Skin, Hyson, Gunpowder,* and *Young Hyson*.

Young Hyson is a delicate young leaf, called in the original language *Yu-tsien* (before the rains), because gathered in the early spring. *Hyson*, from the Chinese word *He-tchune*, which means flourishing spring. This fine tea is gathered early in the season, and prepared with great care and labor. Each leaf is picked separately and nipped off above the footstalks; and every separate leaf is rolled in the hand. It is much esteemed for its flavor. *Gunpowder Tea* is only Hyson rolled and rounded to give it the *granular* appearance whence it derives its name. The Chinese call it *Choo-cha* (pea tea). *Hyson-Skin* is so named from the Chinese term, in which connection *skin* means the refuse, or inferior portion. In preparing Hyson, all leaves that are of a coarse yellow, or imperfectly twisted appearance, are separated, and sold as *skin-tea*, at an inferior price.

Twankay is the last picking of green tea, and the leaf is not rolled or twisted as much as the dearer descriptions. There is altogether less trouble bestowed on the preparation.

Coffees.—Java Coffee.—Use of the imported article, 20 lbs.; dried dandelion root, 7 lbs.; chicory, 13 lbs. Roast and grind well together.

For West India, use rye roasted with a little butter, and ground very fine.

For Turkey Coffee, use rice or wheat roasted with a little butter, 7 lbs.; chicory, 3 lbs.; grind.

Essence of Coffee is made by boiling down molasses till hard; grind to a powder; add ½ lb. of good Java coffee to every 4 lbs. of the mixture. Put up for sale in round tin cans or air-tight paper packages.

Coffee for Pound Packages.—Best Java coffee, 1 lb.; rye, 3 lbs.; carefully clean the rye from all bad grains, wash to remove dust, drain off the water, and put the grain into your roaster, carefully stirring to brown it evenly. Brown the rye and coffee separately, grind and put up in tight packages to preserve the aroma.

Gherkins.—Take small cucumbers (not young), steep for a week in *very strong* brine; it is then poured off, heated to the boiling point, and again poured on the fruit. The next day the gherkins are drained on a sieve, wiped dry, put into bottles or jars, with some spice, ginger, pepper, or cayenne, and at once covered with some pickling vinegar.

Mixed Pickles from cauliflowers, white cabbage, French beans, onions, cucumbers, &c., are treated as *gherkins*, with raw ginger, capsicum, mustard-seed and long pepper, added to each bottle. A little bruised turmeric improves both the color and flavor.

Indian Pickles.—*Piccalilli.*—Take one hard white cabbage (sliced), 2 cauliflowers, pulled to pieces, 20 French beans, 1 stick of horse-radish, sliced fine, 2 doz. small white onions, and 1 doz. gherkins. Cover these with boiling brine; next day, drain the whole on a sieve, put it into a jar, add of

curry powder, or turmeric, 2 oz.; garlic, ginger, and mustard-seed of each 1 oz.; capsicum ½ oz. Fill up the vessel with hot pickling vinegar; bung it up close, and let it stand for a month, with occasional agitation.

A Strong Paste for Paper.—To two large spoonfuls of fine flour put as much pounded rosin as will lie on a shilling; mix with as much strong beer as will make it of a due consistence, and boil half an hour. Let it be cold before it is used.

Napoleon's Camp Sauce.—Old strong beer, 2 qts.; white wine, 1 qt.; anchovies, 4 ounces; mix; boil for ten minutes; remove it from the fire, and add peeled shallots, 3 ounces; macerate for 14 days and bottle.

Pickled Onions.—Choose small round onions, remove the skins, steep them in strong brine for a week in a stone vessel, pour it off, and heat till it boils; then pour on the onions, boiling hot; after 24 hours, drain on a sieve, then put them in bottles, fill up over them with strong spiced vinegar, boiling hot, cork down immediately, and wax over the cork. In a similar manner are pickled mushrooms, cauliflowers, samphires, peas, beans, green gooseberries, walnuts, red cabbages (without salt, with cold vinegar). Observe that the soft and more delicate do not require so much soaking in brine as the harder and coarser kinds, and may be often kept by simply pouring very strong pickling vinegar on them without the application of heat. *For peaches*, select ripe but not soft ones; rub with a dry cloth; put four cloves, free from their heads, in each large peach, and two in small ones; to 1 gallon vinegar, put 6 lbs. brown sugar; put the peaches in a jar and put the vinegar (diluted with water, if too strong), and sugar in a preserving kettle over the fire; boil and skim it; pour it boiling hot over the peaches, covering them closely; repeat the operation three times; then seal them tightly in cans or bottles.

Prize Honey.—Good common sugar, 5 lbs.; water, 2 lbs.; bring gradually to a boil, skimming when cool; add 1 lb. bees' honey and 4 drops essence of peppermint. If you desire a better article, use white sugar, and ½ lb. less water, ½ lb. more honey.

Another.—Coffee sugar, 10 lbs.; water, 3 lbs.; cream tartar, 2 ozs.; strong vinegar, 2 tablespoons; white of an egg well beaten; bees' honey, ½ lb.; Lubin's extract of honeysuckle, 10 drops. Put on the sugar and water in a suitable kettle on the fire; when lukewarm stir in the cream tartar and vinegar; add the egg; when the sugar is nearly melted put in the honey, and stir till it comes to a boil; take it off, let it stand a few minutes; strain, then add the extract of honeysuckle last; stand over night, and it is ready for use. *Another.*—Common sugar, 4 lbs.; water, 1 pt.; let them come to a boil, and skim. Then add pulverized alum, ¼ oz., remove from the fire, and stir in cream of tartar, ¼ oz. and water, or extract of rose, 1 tablespoonful, and it is fit for use.

Milkman's Process.—To give a body to diluted milk use the following nutritive and healthy compound at the rate of 8 oz. to every 5 gals., stirring it up in the milk, till all is dissolved: arrowroot, 6 oz.; magnesia, 6 oz.; starch, 1 lb.; flour, ½ lb.; white sugar in powder, 1 lb.; mix all intimately together, and keep in a dry place for use.

Washing Fluid.—Take 1 lb. sal soda, ½ lb. good stone lime, and 5 qts. water; boil a short time, let it settle, and pour off the clear fluid into a stone jug, and cork for use; soak your white clothes over night in simple water, wring out and soap wristbands, collars, and dirty or stained places; have your boiler half filled with water just beginning to boil, then put in one common teacupful of fluid, stir and put in your clothes, and boil for half an hour, then rub lightly through *one suds only*, and all is complete.

The Northern-Light Burning Fluid.—Get good deodorized benzine, 60 to 65 gravity, and to each brl. of 42 gals. add 2 lbs. pulverized alum, 3½ oz. gum camphor, and 3½ oz. oil of sassafras, or 2 oz. oil bergamot; stir up and mix thoroughly together, and it will soon be ready for use. N. B.—As this fluid creates a much larger volume of light and flame than carbon oil, it is necessary to use either a high burner, such as the sun burner, to elevate

the flame away from the lamp, in order to keep it cool, or instead thereof, to use a burner provided with a tube for the escape of the gas generated from the fluid, such, for instance as the Meriden burner.

Test for Burning Oil.—Heat water in a pot on the fire to 120° Fahr. Take a tin and put in it a tablespoonful of the oil you wish to test, place the tin containing the oil in the hot water, let it cool down to 112° Fahr.; when at this point, approach a light very cautiously towards the oil, and if it takes fire before the light touches it you will be safe in rejecting it.

Baking Powder.—Tartaric acid, 5 lbs.; pure sesquicarbonate of soda. 8 lbs.; potato farina, or other flour or starch, 16 lbs. Dry separately by gentle heat. Mix this perfectly in a dry room, pass the mixture through a sieve and put up at once into damp-proof, hard-pressed packages. To use, 1 or 2 teaspoonfuls are mixed with dry flour which is then mixed with cold water, and baled immediately. *Another.*—Tartaric acid, 1 lb.; pure bicarbonate of soda ¾ lbs.; potato farina, ¾ lb. Treat the same as the last.

Cheap Vinegar.—Mix 25 gals. of warm rain water, with 4 gals. molasses and 1 gal. yeast, and let it ferment; you will soon have the best of vinegar; keep adding these articles in these proportions as the stock is sold.

For Grocers' Sales.—Take three barrels; let one of them be your vinegar barrel; fill this last up before it is quite empty, with molasses, 2 gals.; soft water, 11 gals.; yeast, 1 qt.; keeping these proportions in filling up the whole three barrels; sell the vinegar out of your old vinegar barrel as soon as it is ready, which will be in a short time; when nearly empty, fill it up with the fluid as before, and pass on to sell out of the next barrel; by the time it is disposed of go on to the last; then go back to the first, filling up your barrels in every case when nearly empty, and you will always keep a stock of good vinegar on hand unless your sales are very large; in which case, follow the next process. Have the bung-holes open in the barrels to admit air. The free admission of warm air hastens the process.

Vinegar in Three Days.—Get a quantity of maple, beech or basswood chips or shavings, and soak these in good vinegar, for two or three days. With these chips you will fill a barrel, which has been pierced with a large number of inch holes all around the sides for the free admission of air among the chips (the more holes in the barrel the better, for the more air the sooner the vinegar will be made); cut another barrel in two halves, place one half below the barrel with the chips and the other half above it. The top tub must have its bottom pierced with a number of gimlet holes, in which are placed several threads of twine, to conduct the vinegar evenly over the chips. The liquid drains down slowly through the chips and out of a faucet near the bottom of the barrel into the lower tub. It should run through every four hours, and then be baled or pumped back. Directions to make vinegar from sugar: Use 1½ lb. to each gal. of water; of the dregs of molasses barrels, use 2 lbs. to each gal. of water; small beer, lager beer, ale, &c., which have become sour, make good vinegar by being reduced with water; small beer needs but little water, lager beer as much water as beer; to 2 gals. cider, add ½ gal. water; you can also make excellent vinegar out of the artificial cider mentioned below. Use, in every case, soft water to make vinegar, and use 2 qts. yeast to every barrel. It makes much quicker if the fluid is slightly lukewarm. Leach either of these preparations through the shavings.

This process should be attended to during warm weather, or in a room where a pretty high temperature is kept up, as it will not work otherwise.

Excellent Vinegar, Cheap.—Acetic acid, 5 lbs.; molasses, 2 gals.; yeast, 2 qts.; put them into a forty-gal. cask, and fill it up with rain water; stir it up, and let it stand one to three weeks, letting it have all the air possible, and you will have good vinegar. If wanted stronger add more molasses. Should you at any time have weak vinegar on hand, put molasses into it to set it working. This will soon correct it. Make in a warm place.

White Wine Vinegar.—Mash up 20 lbs. raisins, and add 10 gals. water; let it stand in a warm place for one month, and you will have pure white wine vinegar. The raisins may be used a second time the same way.

Unerring Tests for Good Flour.—Good flour is white, with a yellowish or straw-colored tint. Squeeze some of the flour in your hand; if good, it will retain the shape given by pressure. Knead a little between your fingers; if it works soft and sticky, it is poor. Throw a little against a dry perpendicular surface; if it fall like powder, it is bad.

To Correct Musty Flour.—Carbonate of magnesia, 3 lbs.; flour, 765 lbs.; mix. This improves bad flour, causing it to become more wholesome, producing lighter and better bread than when alum is used, and absorbs and dissipates the musty smell.

To Tell Good Eggs.—If you desire to be certain that your eggs are good and fresh, put them in water; if the butts turn up, they are not fresh. This is an infallible rule to distinguish a good egg from a bad one.

Imitation Beeswax.—Take sixteen pounds yellow rosin, eight pounds mutton tallow, or stearine is preferable, palm oil two and a half pounds; melt together and stir until well mixed, as soon as it begins to thicken pour into basins to cool.

To Cure Butter.—Take 2 parts of fine salt; 1 part loaf sugar; 1 part saltpetre; mix completely. Use 1 oz. of this mixture to each pound of butter; work well. Bury your butter firkins in the earth in your cellar bottom, tops nearly level with the ground, or store away in a very cool place, covering the butter with a clean cloth and a strong brine on the top, and it will keep two years if desired.

To Keep Butter during Hot Weather.—A simple mode of keeping butter in warm weather is to invert a large crock of earthen, or a flower pot if need be, (varying with the size of the vessel containing the butter,) over the dish or firkin in which the butter is held. The porousness of the earthenware will keep the butter cool, and all the more so if the pot be wrapped in a wet cloth, with a little water in the dish with the butter. Not the porosity of the earthenware, but the rapid absorption of heat by external evaporation causes the butter to become hard.

To Restore Rancid Butter.—Use 1 pt. water to each lb. of butter, previously adding 20 grs. chloride of lime to each pt. of water; wash well the butter in this mixture, afterward re-wash in cold water and salt; or melt the butter in a water bath with animal charcoal, coarsely powdered and previously well sifted to free it from dust; skim, remove, and strain through flannel; then salt.

French Patent Mustard.—Flour of mustard, 8 lbs.; wheat flour, 8 lbs.; bay salt, 2 lbs.; cayenne pepper, 4 ozs.; vinegar to mix.

Common Mustard.—Flour of mustard, 28 lbs.; wheat flour, 28 lbs.; cayenne pepper, 12 ozs., or as required; common salt, 10 lbs.; rape oil, 3 lbs.; turmeric to color; mix well, and pass through a fine sieve.

To Keep Fruits Fresh.—Rosin, 2 lbs.; tallow, 2 ozs.; bees-wax, 2 ozs. Melt slowly over the fire in an iron pot, but don't boil. Take the fruit separately, and rub it over with pulverized chalk or whiting (to prevent the coating from adhering to the fruit), then dip it into the solution once, and hold it up a moment to set the coating, then pack away carefully in barrels, boxes, or on shelves, in a cool place. Unequalled for preserving apples, pears, lemons, &c.

Fire Kindlers.—To make very nice fire kindlers, take rosin, any quantity, and melt it, putting in for each pound being used, from 2 to 3 ozs. of tallow, and when all is hot, stir in pine sawdust to make very thick; and, while yet hot, spread it out about 1 inch thick, upon boards which have fine sawdust sprinkled upon them, to prevent it from sticking. When cold, break up into lumps about 1 inch square. But if for sale, take a thin board and press upon it, while yet warm, to lay it off into inch squares; this makes it break regularly, if you press the crease sufficiently deep, greasing the marked board to prevent it from sticking.

To Make an Ice Chest.—Take 2 dry goods boxes, one of which is enough smaller than the other to leave a space of about 3 inches all aronnd when it is placed inside. Fill the space between the two with sawdust packed closely, and cover with a heavy lid made to fit neatly inside the larger box. Insert a small pipe in the bottom of the chest to carry off the water from the melting ice. For family use or grocers' use, this will prove as serviceable as refrigerators that cost twenty times as much.

Premium Method of Keeping Hams, &c,—To 4 gals. water, add 8 lbs. coarse salt; ¼ oz. potash; 2 oz. saltpetre; 2 lbs. brown sugar. Boil together, skim when cold, put on the above quantity to 100 lbs. meat; hams to remain in eight weeks, beef, three weeks. Let the hams dry several days before smoking. Meat of all kinds, salmon and other fish, lobsters, &c., may be preserved for years by a light application of pyroligneous acid applied with a brush, sealing up in cans as usual. It imparts a splendid flavor to the meat, is very cheap, and an effectual preservative against loss.

Soap without Lye or Grease.—In a clean pot put ½ lb. homemade hard or mush soap, and ½ lb. sal-soda, and 5 pts. of soft water. Boil the mixture 15 minutes, and you will have 5 lbs. good soap for 7½ cents. *Hard Soap*—Take 5 lbs. hard soap, or 7 lbs. soft soap, and 4 lbs. sal-soda, and 2 oz. borax, and 1 oz. hartshorn; boil one quarter of an hour with 22 qts. water; add, to harden, ½ lb. rosin.

Friction Soap.—1 lb. brown soap, 2 lbs. fine white sand. Put in a vessel, and heat all together. Mould in small cakes. Pays well.

Best Soft Soap.—Mix 10 lbs. potash in 10 gals. warm soft water over night; in the morning boil it, adding 6 lbs. grease; then put all in a barrel, adding 15 gals. soft water.

MISCELLANEOUS TABLE.

12 units	make 1 dozen, (*doz.*)
12 dozen, or 144	" 1 gross.
12 gross, or 1728	" 1 great gross.
20 units	" 1 score.
56 pounds	" 1 firkin of butter.
100 pounds	" 1 quintal of fish.
50 gallons	" 1 bar. of fish in Mass.
200 lbs. of shad, or salmon	" 1 bar. fish in N. Y. and Ct.
196 pounds	" 1 barrel of flour.
200 pounds	" 1 barrel of pork.
14 pounds of iron, or lead	" 1 stone.
21½ stone	" 1 pig.
8 pigs	" 1 father.

☞ Formerly 112 pounds were allowed for a quintal.

MEASURES OF CAPACITY.

Liquid Measures.

9 old ale gallons	make 1 firkin.
4 firkins	" 1 barrel of beer
7½ Imperial "	" 1 firkin.
52½ Imperial gallons or 63 wine "	" 1 hogshead.
70 Imperial gallons or 84 wine "	" 1 puncheon or " ⅓ of a tun.

2 hogsheads, that is 105 Imperial gallons or 126 wine "	"	1 pipe.
2 pipes	"	1 tun.

Pipes of wine are of different capacities, as follows.

110	wine	gallons	make	1 pipe	of Madeira.
120	"	"	1	"	Barcelona, Vidonia, or Teneriffe.
130	"	"	1	"	Sherry.
138	"	"	1	"	Port.
140	"	"	1	"	Bucellas, or Lisbon.

Solid Candles from Lard.—Dissolve ¼ lb. alum and ¼ lb. saltpetre in ½ pt. water on a slow fire; then take 3 lbs. of lard cut into small pieces, and put into the pot with this solution, stirring it constantly over a very moderate fire until the lard is all dissolved; then let it simmer until all steam ceases to rise and remove it at once from the fire. If you leave it too long it will get discolored. These candles are harder and better than tallow.

Tallow—To Cleanse and Bleach.—Dissolve alum, 5 lbs., in water, 10 gals., by boiling; and when it is all dissolved, add tallow, 20 lbs.; continue the boiling for an hour, constantly stirring and skimming; when sufficiently cool to allow it, strain through thick muslin; then set aside to harden; when taken from the water, lay it by for a short time to drip.

Imitation Wax Candles.—Purify melted tallow by throwing in powdered quick lime, then add two parts wax to one of tallow, and a most beautiful article of candle, resembling wax, will be the result. Dip the wicks in lime water and saltpetre on making. To a gallon of water add 2 oz. saltpetre and ½ lb. of lime; it improves the light, and prevents the tallow from running.

Adamantine Candles from Tallow.—Melt together 10 oz. mutton tallow; camphor, ¼ oz.; bees-wax, 4 oz.; alum, 2 oz.

Soap Manufacture.—When wood ashes cannot conveniently be had it is usual for soap manufacturers to use equal quantities of recently slacked lime, and sal-soda, soda ash or caustic soda, using water enough to give the lye sufficient strength to support a fresh egg. It must be very strong. The solution can be effected by heat, or stirring, or by both methods, finally drawing off, or baling out the liquid clear of sediment, previously throwing in salt and giving time for the sediment to settle; 1 ton of yellow soap will require about 1000. lbs tallow and 350 lbs. resin, with lye sufficient. The same quantity of white soap will require nearly 1300 lbs. tallow, boiling in every case with the proper quantity of lye, until it forms a perfectly homogeneous mass by a perfect blending of the component parts all together, when it is poured out into suitable frames to harden and cool. It is afterwards cut up into proper sized bars by means of wires to which handles are attached and then piled up to dry.

Soft Soap.—Fifteen pounds clear grease, twelve pounds potash, three pails of rain water to the potash, and when dissolved for the lye to bear up a potato so as to show a piece of it as large as a ten-cent piece, it is the right strength to mix with the grease. Have both potash and grease boiling hot when put together. Stir frequently. Let it stand twenty-four hours. Add three pails of water to the residue of the potash, and pour it in a pailful at a time, at intervals of six hours. Then fill up the barrel with cold water added in the same way.

Hard Soap with Lard.—Sal-soda and lard, each 6 lbs; stone lime, 3 lbs; soft water, 4 gals; dissolve the lime and soda in the water by boiling, stir-

ring, settling, and pouring off; then return to the kettle (brass or copper), and add the lard, and boil it till it becomes soap: then pour into a dish or moulds; and, when cold, cut into bars.

Transparent Soap.—Slice 6 lbs. nice yellow bar-soap into shavings; put into a brass, tin or copper kettle, with alcohol, ½ gal., heating gradually over a slow fire, stirring till all is dissolved; then add 1 oz. sassafras essence, and stir until all is mixed; now pour into pans about 1 ½ inches deep, and when cold cut into square bars the length or width of the pan as desired.

German Yellow Soap.—Tallow and sal-soda, of each 112 lbs. resin, 56 lbs; stone lime, 28 lbs; palm oil, 8 oz; soft water, 28 gals. Put soda, lime, and water into a kettle and boil, stirring well; then let it settle, and pour off the lye. In another kettle, melt the tallow, rosin, and palm oil; having it hot, the lye being also boiling hot, mix all together, stirring well and the work is done. *For small quantities*—Tallow and sal-soda each, 1 lb.; resin, 7 oz.; stone lime, 4 oz. palm oil, 1 oz.; soft water, 1 qt.

English Bar-Soap.—Six gals. soft water; 6 lbs. good stone lime; 20 lbs. sal-soda; 4 oz. borax; 15 lbs. fat (tallow is best); 10 lbs. pulverized rosin, and 4 oz. beeswax; put the water in a kettle on the fire, and when nearly boiling add the lime and soda; when these are dissolved, add the borax; boil gently, and stir until all is dissolved, then add the fat, rosin, and beeswax; boil all gently until it shows flakey on the stick, then pour into moulds.

Camphor Soap.—Curd soap, 28 lbs., otto of rosemary, 1¼ lbs. Reduce the camphor to powder, add one ounce almond oil, then sift it, when the soap is melted and ready to turn out, add the camphor and rosemary. *White Windsor Soap.*—Curd soap, 1 cwt., marine soap, 21 lbs., oil soap, 14 lbs., oil caraway, 1½ lbs., oil thyme and rosemary, of each, ½ lb., oils of cassia and cloves, of each, ¼ lb. *Brown Windsor Soap.* Curd soap, ¾ cwt., marine soap, ¼ cwt., yellow soap, ¼ cwt., oil soap, ¼ cwt. Brown coloring (caramel), ½ pt., oils caraway, cloves, thyme, cassia, petit grain and French lavender, of each, 2 oz. *Sand Soap.*—Curd soap, 7 lbs., marine soap, 7 lbs., sifted silver sand, 28 lbs., oils thyme, cassia, caraway, and French lavender, of each, 2 oz.

White Hard Soap with Tallow.—Fresh slaked lime, sal-soda, and tallow, of each, 2 lbs.; dissolve the soda in 1 gal. boiling soft water; now mix in the lime, stirring occasionally for a few hours; after which, let it settle, pouring off the clear liquor, and boiling the tallow therein until it is all dissolved; cool it in a flat box or pan, cut into bars or cakes as desired. It may be perfumed with sassafras oil or any other perfume desired, stirring it in when cool. *One hundred pounds soap, very cheap.*—Potash, 6 lbs; lard, 4 lbs; rosin, ½ lb. Beat up the resin, mix all together, and set aside for five days; then put the whole into a 10-gal. cask of water, and stir twice a day for ten days, when it is ready for use.

Variegated Soaps.—Soft water 3 qts., nice white bar soap 3 lbs., sal-soda, 2 ozs; Chinese vermilion and Chinese blue, of each about 7 grs., oil sassafras ½ oz; shave the soap into thin slices and add it to the water as it begins to boil, when dissolved set it off the fire, take out a cup of soap and stir in the vermilion, take out another cup of soap and stir in the blue; then pour in the contents of the first cup, giving two or three turns only with a stirring stick, then add the other cupful in the same way, then pour into moulds, or into a proper box, and when cold it can be cut into bars; it will present a beautiful streaked apparance.

Transparent Soap.—Slice 6 lbs. nice yellow bar-soap into shavings; put into a brass, tin or copper kettle, with alcohol, ½ gal., heating gradually over a slow fire, stirring till all is dissolved; then add 1 oz. sassafras essence, and stir until all is mixed; now pour into pans about 1½ inches deep, and when cold cut into square bars the length or width of the pan, as desired.

To flavor Tobacco.—This is done by means of a mixture of 1 part each of lemon peel, orange peel, figs, coriander seed and sassafras; ½ part each of elderflowers, elderberries, and cinnamon; 2 parts of saltpetre, 3 of

salt, and 4 of sugar. This mixture must be digested in 50 parts of water, and, before applying it, flavored with an alcoholic solution of gum benzoin, mastic, and myrrh. It is said that this decoction gives a flavor to common leaves resembling Porto Rico, but to this end the leaves must be well dried, about a year old, well permeated with the preparation, kept in a pile for 8 days, turned daily, and finally dried.

Flavor for Cigar Makers.—Take 2 ozs. tonqua beans and 1 oz. cinnamon; bruise and pulverize them to a powder, and put them into 1 pint of Santa Cruz rum; let it stand for a few days to macerate; stir all together, and with this liquid sprinkle your common or inferior tobacco. Dry out of the sun, and the flavor will be unequalled.

Tabac Perfumee aux Fleurs.—is made by putting orange flowers, jasmines, tube roses, musk roses, or common roses, to snuff in a close chest or jar, sifting them out after 24 hours, and repeating if necessary.

Maccaboy Snuff—is imitated by moistening the tobacco with a mixture of treacle and water, and allowing it to ferment.

Spanish Snuff.—Is made, from unsifted Havana snuff, reduced by adding ground *Spanish nutshells*, sprinkling the mixture with treacle water, and allowing it to sweat for some days before packing.

Yellow Snuff.—is prepared from ordinary *pale snuff*, moistened with a mixture of *yellow ochre* diffused in *water*, to which a few spoonfuls of thin mucilage has been added.

Perfumes for Snuff.—Tonqua beans, essence of ditto, ambergris, musk civet, leaves of orchis fusca, and essence of orris root, essence or oils of bergamot, cedar, cloves, lavender, petit grain, neroli and roses, as well as several others, either alone or compounded.

Amber Pipe-stems.—When broken may be joined by smearing the surfaces with boiled linseed oil, and then press them strongly together over a charcoal fire, or other heat, where they will not be likely to suffer injury.

Tea, Adulteration of.—A very considerable amount of ingenuity is displayed, both at home and abroad, in the adulteration of tea, as well as in the manufacture of spurious articles in imitation of it. First, are to be considered the *adulterations of black tea*. The chief adulterations to which black tea is subject consist in the use of leaves other than those of tea, in the re-preparation of exhausted tea-leaves, and in the employment of substances, either for the purpose of imparting color and astringency to the infusion of the leaves, or to glaze and face the surface of the dried leaves, so that they present an improved appearance to the eye. It has been repeatedly ascertained that the leaves of various British plants are sometimes used in this country in the adulteration of tea, among which are the following: beech, elm, horse-chestnut, plane, fancy oak, willow, poplar, hawthorn, and sloe. The leaves are dried, broken into small pieces, and usually mixed up with a paste made of gum and catechu; afterwards they are ground and reduced to a powder, which, when colored with rose-pink, is mixed either with the dust of genuine tea, or with inferior descriptions of black tea. The great difficulty experienced in the re-preparation of exhausted tea-leaves, is to cause them to resume the twisted form imparted by the Chinese method of rolling and drying the leaves. For this purpose, the leaves are steeped in a strong solution of gum; this, in drying, occasions the contraction of the leaves, and causes them to assume to a certain degree their original appearance; the solution at the same time imparts a polished surface to the leaves. The forms of the greater number of the leaves, even after this preparation, are still very different from those of tea, as originally prepared; the leaves are more broken, and agglutinated into small flattened or rounded masses. This circumstance, and the shining appearance of the leaves, are sufficient to enable the experienced eye to detect samples of tea manufactured from exhausted leaves, even when mixed with a portion of unused tea. When a solution of sulphate of iron is brought into contact with a solution of tannin, or one of tea (which contains a large amount of tannin), the liquid becomes deeply colored. Of this fact the fabricators of spurious tea are

well aware: for they avail themselves of it, and frequently add to the gum-water to be used in making up exhausted tea-leaves, a proportion of sulphate of iron. Rose-pink is another adulterating agent; it consists of the coloring matter of logwood, in combination with carbonate of lime. An infusion of the wood is first prepared, through which the lime is diffused, and this, in subsiding, carries with it the characteristic color, which, incorporated with the lime, forms rose-pink. The presence of logwood is immediately detected by moistening a small portion of the tea-leaves of the sample with water, and rubbing it gently about upon a sheet of white paper, which, in that case, will be stained bluish-black; moreover, if a portion of the tea, being thrown in cold water, imparts immediately to the liquid a pinkish or purplish color, which is rendered red by the addition of a few drops of sulphuric acid, it is a sign of the presence of logwood; for genuine black tea produces only after a time a golden brown liquor; which is not reddened by sulphuric acid. One of the substances resorted to for facing tea is plumbago, or black lead, which gives to the surface of the leaves a black, shining, and metallic or leaden appearance, so characteristic, that when once seen it may be again readily recognized. Also, if a thin slice be removed from the surface of one of the leaves faced with this substance, and placed under the microscope, it will be seen to be thickly studded with numerous minute black particles. Again, if one or two teaspoonfuls of such tea be infused in boiling water, the liquid, after a time, will, in many cases, when the quantity of facing is considerable, acquire a blackish hue, and, on evaporation, the bottom of the vessel containing it will be found to exhibit the dark, shining and characteristic coating of black lead. *The adulteration of green tea* may be next considered The development of the characteristic color of the leaves of green tea is stated to take place during the third roasting in the *kuo*, the leaves at the end of the second roasting being of a dark olive color, almost black. In the third roasting which is, in fact, the final drying, the heat of the fire is diminished, the quantity put into the *kuo* is greatly increased, and the time of roasting regulated. At this period, a change of color takes place in the leaves, they beginning to assume a bluish tint, resembling the bloom on fruit. The colors used in the facing of green tea are usually three: yellow, blue, and white. The yellow and blue colors, when mixed, form a green, and white is added, either to lessen the intensity of the former colors, or else to give polish to the surface of the leaves. Prussian blue is the substance most frequently employed in the facing of spurious green tea. It is distinguished from indigo by the iron which enters into its composition, and which may be detected by the ordinary tests, as well as by the non-effect of chlorine in bleaching it. Under the microscope it may be recognized by the form and color of the particles of which it consists, as also by the action of liquor potassæ, and dilute sulphuric acid; the first turns the fragments of a reddish hue, and the other restores the color. Although not absolutely poisonous, yet when introduced into the system, even in minute quantities, it is in some cases capable of exerting an injurious action. Verdigris, Dutch pink, chromate of potash, chrome yellow, and other substances more or less noxious, are used in the adulteration of black tea. The detection of adulteration will be considerably facilitated by pointing out the simple methods to be adopted for determining whether a sample of tea be sufficiently colored or not. For this purpose, if the leaves be coated to any considerable extent, it will be sufficient simply to view one or two of them as opaque objects, with a glass of one inch focus, when the coloring matters entering into the composition of the facing will be detected as minute specks or particles, each reflecting its appropriate tint. Another method of determining the same point is to scrape gently the surface of two or three of the leaves with a penknife, when, if they be faced, the coloring matters may be detected in the powder thus separated, viewed as an opaque object. A third method is to place five or six leaves on a slip of glass, moistening them with a few drops of water, and, after the leaves have become softened, firmly squeezing the

water out between the finger and thumb; this will then be found to contain more or less of the ingredients forming the facing, should such have been employed. Or, should it be desirable to obtain the results on a large scale, half an ounce or so of the leaves may be agitated in a little water for a few minutes; this will detect much of the facing, without unfolding the leaves, and after a time the facing will collect as a sediment at the bottom of the vessel. Lastly, the tea-dust, more or less of which is present in nearly every sample of tea, is usually found to contain the ingredients used in the facing in considerable quantity, and from its examination satisfactory results may in general be very readily obtained. Having by one or other of the above processes determined whether the sample of tea be faced, the next step is to ascertain the nature of the substances used for this purpose. The blue coloring matter has generally been found to be either Prussian blue or indigo, most frequently the former. Prussian blue is recognized under the microscope by the angular form of the fragments, and by their brilliant and transparent blue color, but most decidedly by the action of liquor potassæ, which quickly destroys the blue, tinging the fragments of a dull reddish brown color. Indigo is distinguished under the same circumstances by the irregular form of the particles, their granular texture, and greenish-blue tint, but chiefly by the fact that the color is not destroyed by the liquor potassæ. Turmeric powder is at once recognized by its size and bright yellow color; and Dutch pink, by the action of liquor potassæ and acetic acid; the one re-agent converts the bright yellow into a dark brown, and the other occasions effervescence. The chief points to be recapitulated are; that the principal *black teas*, namely, the Congous and Souchongs, arrive in this country for the most part in a genuine state; that certain descriptions of black tea, as scented Orange, Pekoe, and Caper, are invariably adulterated, the adulteration consisting in general in the glazing of leaves with plumbago or black lead; the caper likewise being subject to admixture with other substances, as paddyhusk, lie tea, and leaves other than those of tea. That several varieties of a spurious caper, or black gunpowder, are prepared, which consist of tea-dust, and sometimes the dust of other leaves and sand, made up into little masses with gum, and faced with plumbago, Prussian blue, and turmeric powder; in some cases these imitations are sold separately, but most frequently they are used to mix with and adulterate the better qualities of caper. With respect to *green tea*, the principal conclusions are, that these teas, with the exception of a few of British growth and manufacture from Assam, are invariably adulterated; that is to say, are glazed with coloring matters of different kinds. That the coloring matters used are in general Prussian blue, turmeric powder, and China clay, other ingredients being sometimes but not frequently employed. That these coloring matters possess properties calculated to affect the health injuriously. That in this country there is really no such thing as a green tea; that is, a tea which possesses a naturally green hue. That green teas, and more especially the gunpowders, in addition to being faced and glazed, are more subject to adulteration in other ways than black teas, as by admixture with leaves not those of tea, with paddy-husk, and particularly with lie tea. That lie tea is prepared so as to resemble green tea, and is extensively used by the Chinese themselves to adulterate gunpowder tea. The above are the most important conclusions as to the condition of black and green teas as imported, but these articles undergo further deterioration in our own country, as follows:—That exhausted tea-leaves are frequently made up with gum, &c., and resold to the public as genuine black tea, and, when artificially colored and glazed, even as green tea. That the substances employed in the coloring are in many cases very much more objectionable and injurious than those used by the Chinese, being often highly poisonous. That it is no uncommon thing for tea, both black and green, to be fabricated from leaves not those of tea, and possessing no properties in common with the leaves of that plant. That black lie tea is often colored and extensively employed by our own dealers and grocers for the adulteration of green tea

COFFEE, ADULTERATION OF.—The extensive adulteration of this article of consumption is betrayed by the fact that a much larger quantity of a substance *called* coffee is annually sold than passes through the Custom House. The chief articles with which coffee is adulterated are chicory, different kinds of grain, potatoes, and beans. In addition to these articles, another ingredient is used, known as the coffee colorer, and this consists chiefly of burnt sugar. When coffee is suspected, a portion of it should be placed gently on the surface of a glass of water; the genuine powder will remain swimming on the water, but the adulterants will sink to the bottom. The reason why the coffee floats upon the liquid is to be found in the quantity of essential oil which it contains, making it lighter than the water, which it at the same time repels. It will also be observed in repeating these experiments, that the water to which coffee alone has been added becomes scarcely colored for some time, whilst that with the chicory, in less than a minute, assumes a deep brown tint. The presence of roasted grain may also be detected by the blue color produced on the addition of a solution of iodine to the cold decoction. These researches may be further aided by the use of a microscope, by which the difference in the grain of the coffee and other ingredients will be readily detected. Never buy *ground* coffee except of tradesmen of unquestionable integrity; some grocers make it a practice, in order to give their customers confidence, to grind the coffee while they wait for it. In such cases, chicory is frequently left in the mill to mingle with the coffee that is introduced, or a box of chicory nibs of about the size of coffee berries is kept upon the counter, a handful or so of which are adroitly thrown into the mill during the process of grinding. In choosing *whole* coffee, care should be taken that the berry is not too dark; for, if so, it has been too much roasted, and some of its active properties have necessarily been injured or destroyed. Above all, the coffee drinker should never buy the coffee contained in canisters, for he may be assured that it is even more adulterated than other coffee not so packed.

SUGAR, ADULTERATION OF.—The adulteration of sugar chiefly consists in the mixing together, in various proportions, of sugars of different qualities and prices, none of which are very pure and some highly impure; an article is thus prepared presenting a tolerable appearance to the eye but which is really one of very great impurity, and rarely what it professes to be. The impure sugars are dark colored, imperfectly crystallized, heavy and clammy, readily caking into masses: examined with the microscope they are found to contain fragments of cane, woody fibre, grit, &c. Nearly all the brown sugars imported into this country, contain a large amount of impurity, but in general the sugar procured from the grocer does not alone contain this same amount; but it is increased, sometimes doubled and trebled, by the use of variable proportions of other sugars still more impure, in fact, the most impure that can be purchased; so that, in the state in which it reaches the public, it is very unfit for use. Sugar is sometimes adulterated with flour. This is used partly to improve the color of very dark and bad sugar, and partly to cause the absorption of the water of the treacle with which dark-colored sugars are in general contaminated. Pieces of woody fibre, and stony particles, or grit, are also commonly found in sugar. The impurities and adulterations of sugar may be detected by the appearance of the sugar, by the touch, by the effect of its contact with paper, by the microscope, and by chemicals. *By the appearance*—A pure sugar is light-colored, highly crystalline, and very dry. Impure sugars are dark-colored, imperfectly crystalline, small grained, often presenting an earthy appearance, damp, and heavy. *By the touch*—A good sugar should be perfectly dry to the touch, and should not feel in the least sticky or clammy when pressed between the fingers; on the other hand, a bad sugar, when treated in the same way, feels moist and sticky. *The effect of contact with paper*—The thick sugar paper is generally employed by grocers on account of its absorbent power. When the quantity of moisture is very great, owing to the admixture of grape-sugar, treacle, &c., the thick sugar-paper

absorbs a portion of the fluid, and becomes wetted and stained: the extent of the discoloration, and the state of the paper as respects moisture, affording a very good criterion as to the quality of the sugar. This is a very simple and excellent method of ascertaining, in many cases the quality of sugar, which in addition to staining the paper, if impure from admixture with treacle and grape-sugar, will also become hard and caked; in doubtful cases, the sugar should be allowed to remain in the paper for two or three days. The quantity of this water present in many sugars is so great, that it adds very considerably to the weight; for every drachm of water to the pound of sugar there must be just so much less of pure cane-sugar so that as a question of economy merely, putting aside all ideas of purity, cleanliness, and health, it is very doubtful whether the buyer becomes a gainer by the purchase of the cheaper, less pure, and much heavier sugars. *By the microscope*—By means of this instrument the presence of the sugar acari, the sporules of fungus, fragments of cane, wood and starch granules, may be ascertained, and the adulteration by means of flour, &c., determined. By absolute test the fact has been arrived at that the brown sugars of commerce are, in general, in a state wholly unfit for human consumption, and the inferior sorts should be especially avoided. Lump sugar is free from the greater part of the impurities and adulterations by which brown sugar is so largely contaminated and deteriorated; it does not contain acari, fungi, grape-sugar, albumen, or grit, the chief impurities consisting of starch granules, and microscopic chips, or fragments of woody fibre. The general use of refined or lump sugar is, therefore, to be recommended. The quality of the lump sugar is comparatively a secondary consideration, as the worst lump sugar is infinitely more pure than the best brown sugar that can be obtained.

Tobacco, Adulteration of.—The following are the substances which have either been discovered or have been stated on good authority to have been employed in the adulteration of tobacco, either in the form of cut or roll tobacco, cigars, or snuff. They may be divided, first, into vegetable substances not tobacco, as the leaves of the dock, rhubarb, coltsfoot, cabbage, potato, &c., malt cummings, that is, the roots of germinating malt; peat, which consists chiefly of decayed moss; seaweed, roasted chicory root, bran, catechu, and oakum. Secondly, sub-saccharine substances, as cane-sugar, treacle, honey, beet-root dregs. Thirdly, into salts and earths, as nitre, common salt, sal ammoniac, nitrate of ammonia, carbonate of ammonia, potash, soda, and lime-water; yellow ochre, umber, fuller's earth, Venetian red, sand, chromate of lead. The detection of some of the above substances is easy enough, but others present great difficulties. The method of examination to be pursued is as follows:—A certain quantity of each tobacco (100 grains) is to be weighed immediately after it is purchased, before it has had time to lose weight by evaporation, and thoroughly dried at a temperature of about one hundred degrees of Fahrenheit. It is then to be re-weighed: the loss or percentage of water is by this means ascertained. Each sample may next be thoroughly examined by means of a microscope, in order to ascertain whether there be any foreign vegetable substance present; if it contain any of those enumerated above, in ever so fine a state of powder, and even in the smallest quantities, they may be detected with the greatest certainty with the aid of the microscope. The structure of the tobacco leaf differs materially from that of other leaves, and may thus be readily distinguished. With regard to the method of proceeding for the detection of grape-sugar or glucose in tobacco, the following simple method will be found efficient. Take one thousand grains of a solution of tobacco, containing two grains of the dried extract to one ounce of water; add four drachms of liquor potassæ, boil, filter, and then add about four hundred grains of Fehling's test liquid, and heat to boiling; if any glucose be present, the red oxide of copper will be thrown down; collect, and thoroughly wash the precipitate in order to free it from any albumen that may be present, weigh and calculate it as before.

BREWERS, WINE & SPIRIT MFRS., &C.

Making, Bottling and Preserving all kinds of Ales, Wines, Spirits, &c.

Wines, Nature and Treatment of.—Young wine is bright and red at first, owing to the presence of phosphoric and other acids. As these acids become subdued, the color is subdued also, until all that raw brightness, indicative of immaturity, is mellowed and ripened into the rich tawny hue—that mixture of glowing red and yellow brown, with the golden light striking through, which every one takes as his surest guide in the choice of port and red wines. The bouquet of wines depends upon the proportion which they contain of a kind of ether. It does not exist in the juice of the grape, but is produced during fermentation, and increases in quantity by keeping. The odor of this substance is very powerful, and is one of the general characteristics of all grape wines. The crust of wine is thus explained: Tartaric acid exists in the juice of the grape in combination with agents, forming cream of tartar. When the fermented juice is left at rest, this cream of tartar gradually separates from the liquor, and deposits itself as a crust, or tartar, on the sides of the casks and bottles. Hence, by long keeping, good wines become less acid, and every year added to their age increases in proportion their marketable value. A damp cellar aids the maturation of wines. A factitious mode of bringing forward bottled port wine, is occasionally to throw over it cold water; but, after the wine has become ripe, it must be drunk speedily, else it will soon become unfit for the table. If newly-bottled wine be exposed to the sun, it will begin shortly to deposit and improve in flavor; and even the rawest wine of this kind by placing the bottle in water, and boiling it, will cause it to assume the quality it would have had after many years keeping. The choicest wines are ordinarily iced; whereas (with the exception of wine which gains strength by cold), common wines only should be iced; and even they would be better if merely cooled with water, which imparts sufficient coolness to wine even at the hottest temperature of summer. But, it is not only the avoidance of icing choice wines that attention must be paid to; each separate kind requires a different degree of cold and warmth. Thus, claret, when just brought out of the cellar, has not that soft and delicate flavor which gives this wine its peculiar value. Before drinking it, the wine should be placed where it may imbibe a degree of warmth. In winter it should be placed before the fire. Burgundy should be drunk fresh from the cellar. A decanter of wine may be readily cooled by folding round it a wet cloth and placing it in a current of air.

Wines, Home Made, to Improve.—Poor wine may be enriched by being racked off, and afterwards returned into the cask; and then putting into the wine, about a pound of raisins bruised, and a quart of brandy. An

ounce of powdered roche alum, mixed in four gallons of the wine and returned to the cask, will make the whole fine and brisk in ten days. Pricked wines may be restored by being racked off into a fresh cask, which has contained some of the same kind of wine. The cask is to be matched or sulphured; and to every ten gallons, put two ounces of oyster-shell powder, and half an ounce of bay salt; then stir it, and let it stand for a few days to fine: after which, rack it off into another cask also matched. A quart of brandy added to every ten gallons, will further improve the wine. Acidity may be cured as follows:—Burn dry walnuts over a charcoal fire, and when they are thoroughly lighted, throw them into the wine, and bung up the cask; in forty-eight hours all acidity will have departed. Mustiness and disagreeable flavor may be removed by ripe medlars, or bruised mustard-seed, tied in a bag and suspended from the bung-hole. To remedy ropiness in bottled wine, shake it for twenty minutes, uncork it, and pour off the pith or scum, when the residue of the wine will be drinkable.

Wine Casks, to Sweeten.—There are several methods of doing this. 1. If a cask, after the contents are taken from it, be well stopped, and the lees be allowed to remain in it till it is again to be used, it will only be necessary to scald it; taking care, before filling it, to see that the hoops are well driven. Should the air get into the cask, it will become musty, and scalding will not improve it; the surest way will be to take out the head of the cask to be operated on, then burn it a little, and scald it for use. 2. Set fire to a pound or more of broken charcoal, put it into the cask, and immediately fill up the cask with boiling water. After this, roll the cask once or twice a day for a week; then pour out the charcoal and water, wash out the cask with clean cold water, and expose to the external air for some days. 3. Mix half a pint of the strongest sulphuric acid in an open vessel, with a quart of water, put it into the cask, and roll it about well; next day, add a pound of chalk, bring the cask down, and in three or four days, wash it out thoroughly with boiling water. To prepare a match, melt some brimstone, and dip into it a long narrow slip of coarse linen cloth, or of brown paper; when to be used, set fire to the match, put it in at the bung-hole of the cask, fastening one end of the bung, and let it remain for a few hours.

Cider, Method of Making.—A beverage made from the juice of the apple, and for which sour and rough-tasted apples are generally preferred. The process of making cider varies in different localities, but in every case essentially consists of the collection of the fruit, and the expression and fermentation of the juice. The *collection of the fruit* should not be commenced before it has become sufficiently mature; they should be picked by the hand, and any unsound fruit, or such as may have lain on the soil, should be rejected. The apples after being gathered, are usually left for fourteen or fifteen days in a barn or loft to mellow, during which time the mucilage is decomposed, and alcohol and carbonic acid developed. When this process is completed, the fruit should be looked through, the bruised and decayed apples placed in a heap by themselves for an inferior cider, from which to make vinegar, the remainder wiped perfectly dry, and laid ready for use. The *expression of the juice* is the next step in cider-making. The apples are ground to a pulp in a mill, consisting of two fluted cylinders of hardwood or cast iron working against each other. The pulp is afterwards put into coarse strong bags, and pressed with a heavy weight so as to squeeze out of them all their juice. The juice is placed in large open tubs, and kept at a heat of about sixty degrees. They are now constantly attended to, and kept quite full, in order that the yeast, as it forms, may froth over and be carried off from the surface of the liquor. After two or three days for weak cider, and eight or ten days for strong cider, or as soon as the sediment has subsided, the liquor is "racked off" into clean casks. The casks are then stored in a cellar, shaded barn, or other cool place, where a low and regular temperature can be ensured, and are left to mature and ripen until the following spring, when it may be re-racked for use. The pressed pulp is again sprinkled with one-third or half its weight of water,

and repressed. The resulting liquor, when fermented, forms a weak kind of cider, which is reserved for domestic use in the same way as table-beer. The refuse pulp is an acceptable food for pigs and store cattle.

Preparatory to *bottling cider*, it should be examined, to see whether it is clear and sparkling. If not so, it should be clarified, and left for a fortnight. The night previous to bottling, the bung should be taken out of the cask, and left so until the next day, and the filled bottles should not be corked down until the day after; as, if this is done at once, many of the bottles will burst by keeping. The best corks should be used. Champagne bottles are the best for cider. It is usual to wire down the corks and to cover them with tinfoil, after the manner of champagne. A few bottles at a time may be kept in a warm place to ripen. When the cider is wanted for immediate use, or for consumption during the cooler season of the year, a small piece of lump sugar may be put into each bottle before corking it. When intended for keeping, it should be stored in a cool cellar, when the quality will be greatly improved by age. Cider for bottling should be of good quality, sound and piquant, and at least a twelvemonth old. When out of condition, it is unfit for bottling.

Cider Champagne.—Cider, eighteen gallons, spirit, three pints, sugar, five pounds. Mix and let them rest for a fortnight, then fine with skimmed milk, 1 pint. Bottle in champagne bottles; when opened, it will be found to approach very nearly to genuine champagne.

Punch.—A name given to a mixture composed of water, spirit, sugar and acid. The punch most generally made is composed of equal parts of rum and brandy; but any mixture of spirits, or one spirit alone, if there be acid with it, is called punch. The following are among the most approved receipts for compounding this beverage. *Ordinary punch.*—Take two large rough lemons, juicy, and with rough skins; rub some large lumps of loaf sugar over the lemons till they have acquired the oil from the rind, then put them into a bowl, with as much more sugar as is necessary to sweeten the punch to taste; squeeze the lemon-juice upon the sugar, and bruise the sugar in the juice; add a quart of boiling water, and mix well; then strain through a fine sieve, and add a quart of rum, or a pint of rum and a pint of brandy, or a pint and a half of rum and half a pint of porter; then add three quarts more of water, and mix well. *Oxford punch.*—Extract the essence from the rinds of three lemons by rubbing them with lumps of sugar; put these into a large jug, with the peels of two Seville oranges, and of two lemons, cut extremely thin, the juice of four Seville oranges and of ten lemons, and six glasses of calf's foot jelly in a liquid state. Stir these well together, pour to them two quarts of boiling water; cover the jug closely, and set it near the fire for a quarter of an hour; then strain the mixture through a sieve into a punch-bowl or jug, sweeten it with a bottle of capillaire, add half a pint of white wine, a pint of French brandy, a pint of rum, and a bottle of orange shrub; stir the punch as the spirit is poured in. *Roman punch.*—Take a quart of lemon-ice, add the whites of three eggs, well beaten, with rum and brandy, till the ice liquefies, in the proportion of three parts of rum to one of brandy, and water to taste. Then add a small teacupful of strong green-tea infusion, strained; add, also, half a pint of champagne. *Regent's punch.*—Take a bottle of champagne, a quarter of a pint of brandy, the juice of a lemon, a Seville orange, and a wineglassful of Martinique; with this mix a pint or more of strong infusion of the best green tea, strained; add syrup or sugar to taste. *Norfolk punch.*—Steep the peels of six lemons and six oranges in a gallon of brandy for two days; then make a syrup with three pounds of loaf sugar, and when it is quite cold, add it to the brandy, which should have been previously strained; add the strained juice of eighteen lemons and eighteen oranges, and let the whole stand for six weeks in a closely corked jar, after which bottle. *Tea punch.*—Make an infusion of the best green tea, from an ounce of tea to a quart of water; put before the fire in a silver or other metal bowl, to become quite hot, and then put into it half a pint of brandy, half

a pint of rum, a quarter of a pound of loaf sugar, and the juice of a large lemon; set these into a blaze, and pour in the tea gradually, mixing it from time to time with a ladle; it will thus remain burning for some time, and in this state is to be poured into the glasses.

Gin.—A spirituous liquor, of which there is a large consumption. Gin is rarely sold to the public in the state in which it comes from the distillery; it would, in fact, be not so agreeable to the palate in that state; and publicans, therefore, are in the habit of "making up" this liquor for sale, the following being one among many recipes. Good gin (22 under proof), 90 gallons; oil of almonds, one drachm; oils of cassia, nutmeg and lemon, of each, two drachms; oils of juniper, coriander, and carraway, of each, three drachms; essences of orris-root and cardamoms, of each, five fluid ounces; orange-flower water, three pints; lump sugar, 56 to 60 lbs.; dissolved in water, four gallons. The essences are dissolved in two quarts of spirits of wine, and added gradually to the gin, until the requisite flavor is produced, when the sugar (dissolved) is mixed in along with a sufficient quantity of soft water, holding four ounces of alum in solution, to make up 100 gallons. When the whole is perfectly mixed, two ounces of salt of tartar, dissolved in two or three quarts of hot water, are added and the liquor is well stirred up; after which the cask is bunged up and the liquor allowed to repose. In a week it will become brilliant, and may be either "racked" or drawn from the same cask. *Gin sweetened*, prepared from unsweetened gin (22 under proof), 95 gallons; lump sugar, 40 to 45 lbs.; dissolved in clear water, 3 gallons; mix well; and fine it down as above. It is almost needless to add that all gin is more or less adulterated before it is sold by the retail dealer; the ingredients employed by some are, however, harmless compared with the noxious compounds introduced by others; but the consumer has fortunately the means of detecting these adulterations by his palate.

Bottling Wine.—The first thing to be attended to is the choice of good corks; they should be perfectly new, well cut, and flexible; any having black spots in them should be rejected. When the wine runs clear, place a shallow tub under the tap of the cask, and take care that there are two or three small holes near the bung or in it, to allow the air an ingress, to supply the place of the wine withdrawn. All being ready, hold the bottle under the tap in a leaning position. Fill the bottle to within two inches of the top of the neck, so that when the cork comes in, there may remain three-quarters of an inch of space between the wine and the lower end of the cork. The corks should be dipped, not soaked, in wine, and should enter with difficulty; they are driven in with a wooden mallet. If the cork is to be waxed it must be cut off to less than a quarter of an inch. Champagne bottles must have their corks driven about half way, and fixed down by a wire, this makes them easy to draw. While a cask of wine is bottling off, it is impossible to exclude the admission of air to the surface of the liquor, except some particular method is employed, and if the operation lasts some time, the wine is almost certain to be injured; the best prevention for this, is a bottle of fine olive oil, which being poured into the cask and floating on the surface of the wine, totally excludes the air, and prevents acidity or mouldiness for a whole year. When the crust, or precipitation of wine in bottles, is deposited in excess, and is about to be removed, the wine should be decanted into fresh bottles, or the deposit may mix with and injure the wine. Wine to be fit for bottling, must not only be separated from the gross lees, and have attained perfect clearness by fining, but it must also remain a certain time in the cask to ripen; for this, no precise rule can be laid down. Generally speaking, however, wine should not be bottled until it has lost its sharpness, and is no longer liable to fermentation. When wine is bottled too soon it often ferments and remains always sharp: the best time to perform this operation is in the month of March or October, especially if the weather be fine and clear.

Bottling Malt Liquors.—Before proceeding to bottle ale or porter, it is necessary to ascertain whether the liquor is in a proper state for that pur-

pose ; if it is but slightly saccharine, and has but little briskness, it is in a fit state for bottling ; but if, on drawing out the vent peg, it spirts up with force it is a sign that the liquor is still too active to be bottled with safety. Should the beer appear a little too brisk and frothy while bottling, the bottles may be left open for a few hours, and filled up as the froth works out, but they should be filled only to within an inch of the cork. It must be observed that if the corks are driven in while the liquor is working much, there is always a danger of the bottles bursting. Great care should be taken to bottle at the proper time. When a cask of beer is to be bottled, the bung may be loosened, and the beer left exposed to the air for a few hours to flatten it, to prevent the bottles bursting. The *corks* used should be of the best quality ; previously to inserting them they should be soaked in a little beer ; and when the bottles are corked they should be laid on their sides that the beer, by swelling the corks, may make them quite tight. The bins should be constantly inspected, to ascertain the state of the liquor, and as soon as the bursting of one bottle is discovered, the remainder should all be set upright to prevent further loss. If the beer is a little too flat when bottled, or if it is wanted to *be up*, as it is termed, very soon, a lump of sugar may be put into each bottle, or four or five raisins, or a teaspoonful of rice ; these by giving rise to a new fermentation, will make the beer quite brisk. The warmer the weather or the warmer the place where the bottles lie, the sooner will fermentation begin, and the beer be ripe and fit for use. Strong ales may be kept in bottles of glass, without the risk of forcing out the cork or bursting the bottle.

Clove Cordial.—Put into a large stone jar, a quarter of a pound of cloves, half an ounce each of cinnamon, nutmeg, and coriander seeds ; quarter of a pound of red currant jelly ; ten ounces of sugar-candy ; 1 ounce each of candied citron, orange, and lemon-peel, sliced ; an ounce and a half of dissolved isinglass ; three ounces of preserved ginger sliced ; two ounces of sweet and one ounce of bitter almonds, blanched and pounded ; nine ounces of powdered loaf sugar ; one pint of red cordial water ; one gallon of proof spirit of wine. Stop up the jar effectually and shake it well daily for a month ; then put it away in a dry room and let it stand for twelve months. Strain and filter it into small bottles ; cork and seal them. The cordial will be fit for use in two months, but further age will improve it.

Coriander Cordial.—To half a gallon of spirits put half a pound of coriander seeds, quarter of a pound of caraway seeds, half a pound of sugar, and one drop of oil of orange. Make it up to three quarts with water. The coriander seed must be bruised and steeped in the spirit for ten or twelve days, and well stirred two or three times a day.

Peppermint Cordial.—To make five gallons of this cordial, take three and a quarter gallons of rectified spirit, three pounds of loaf sugar, a gill of spirit of wine, four pennyweights of oil of peppermint ; fill up the cask with water until the quantity becomes five gallons ; rouse it well, and set the cask on end.

Ginger Cordial.—Take one pound of raisins, the rind of one lemon, and three-quarters of an ounce of bruised ginger. Steep these ingredients in a quart of the best brandy, then strain it, and add one pound of powdered loaf sugar to every quart of juice.

Cherry Wine, Black.—Pick forty quarts of fine ripe black cherries, bruise them with the stones in a tub, and pour on them ten gallons of cold soft water that has been boiled, stir them well, and leave the vessel closely covered until the following day. Press the fruit in a hair-bag, strain the liquor through a fine sieve, let it settle for two hours, and repeat the straining ; then filter it through flannel, and put it into a cask with twenty pounds of moist sugar, stirring it well for twenty minutes. Leave the bung out for five or six days, and when it has ceased fermenting pour in a quart of French brandy, and bung it securely. In three or four months draw out a wineglassful, and if it is perfectly clear and bright, it may be bottled a month afterwards ; if not, rack it off, filter the lees thoroughly, and return all that

is clear into the cask. Secure the bung again, and in three months it will be fit to bottle; keep it in bottle six months, or longer.

Cherry Wine, Red.—Press ripe red cherries, breaking the stones amongst them, until you have obtained ten gallons of pure juice, to which add twenty-four pounds of moist sugar; mix it well, and let it remain for three days covered up, stirring twice daily. Press the fruit in a horse-hair bag, and add the expressed juice, then mix them well, and strain the whole into a cask, adding five pints of French brandy, the rinds of six lemons thinly pared, and an ounce of isinglass dissolved in a little water. Bung the cask securely, and let it remain in a cool cellar for six months; then rack the wine off, filter the lees perfectly fine, and put all into the same cask again, with three ounces of sugar-candy. Secure the bung as before, keep the wine eighteen months, then bottle it. It will be in good condition after being six months in bottle, but the longer it is kept the better it will be.

Clarification.—The act of clearing or making bright, commonly applied to the process of clearing liquids by chemical means instead of by filtration. The substances employed in the clarification of liquids operate by either mechanically embracing the feculous matter, and subsiding with it to the bottom of the vessel, or by inducing such a change in its nature and bulk that it subsides by its own density, in each case leaving the liquor transparent. Albumen, gelatine, the acids, certain salts, blood, lime, plaster of Paris, alum, heat, alcohol, &c., serve in many cases for this purpose. The first is used under the form of white of egg, for the clarification of syrups, as it combines with the liquid when cold, but on the application of heat rapidly coagulates and rises to the surface, carrying the refuse with it, forming a scum which is easily removed. Gelatine, under the form of isinglass dissolved in water or weak vinegar, is used to fine white wines, beer, cider, and similar liquors. Sulphuric acid is frequently added to weak liquors for the same purpose. Bullocks' blood is used in the same way as isinglass or white of eggs, for fining red wines, beer, and porter. Lime, alum, alcohol, the acids, and heat, act by curdling or coagulating the feculencies, and thus, by increasing their density, induce their subsidence. Plaster of Paris acts partly like the above and partly like albumen or gelatine, by developing and forcing down the suspended matter.

Beer, to Preserve.—When it is intended to keep beer a long time, it should be very carefully racked off; for nothing advances the decomposition so soon, after a certain time has elapsed, as the lees. *The clarification of beer* is very important for its preservation. This is done in various ways; such as with hartshorn-shavings, white of egg, or isinglass. Many things are used either when beer is first put in casks, to prevent its turning sour, or when it has already began to turn; few things however can be introduced for this purpose without rendering the beer vapid. One of the best means for preventing the turning of beer, intended for a voyage, or which may be liable from other circumstances to agitation or change of temperature, is to put stale eggs into the cask, in the proportion of one egg to four gallons of beer. The shell dissolves first, then the pellicle and the white, leaving the yolk intact. The albumen of the egg is said to act as an alkali, but without creating any effervescence, which has a tendency to render beer vapid. For weak beer, oatmeal, burnt sugar, or a portion of very strong beer, may be added in the summer; and in brewing beer of all kinds, it will be found beneficial to suspend in the cask, at the commencement of fermentation, a linen bag containing raisins in the proportion of a pound to one hundred and seventy-four gallons of beer. Leave it thus for twenty-four hours, and then having withdrawn it, allow the beer to ferment in the regular course.

Beer, Bottling and Fining.—Casks should be sound, clean, and sweet. Beer and porter should be allowed to stand in the bottles a day or two before corked. If for speedy use, wiring is not necessary. Laying the bottles on their sides will assist the refining of the beer. Those that are to be kept should be wired, and set upright in sawdust. When not fine enough,

draw off a jugful, and dissolve isinglass in it, in the proportion of half an ounce to ten gallons, and pour back through the bung-hole. Let it stand a few weeks longer. Tap the cask above the lees. When the isinglass is put into the cask, stir it around with a stick, taking great care not to disturb the lees at the bottom. Bung the cask up, and in a few days the beer will be fine.

ALE.—A bushel and three quarters of ground malt, and a pound of hops, are sufficient to make 18 gallons of good family ale. As soon as the water boils, dip off half of it into a tub or vat raised upon a bench about a foot and a half from the ground, and which has a hole in its side, near the bottom, into which is put a spigot and faucet sufficiently large, and over the end of which, in the vat, is fixed a bundle of small clean sticks, or other convenient apparatus, to prevent the malt from running out. Let the hot water remain undisturbed in the vat, till it has cooled down to about the temperature of 175 or 180 degrees of Fahrenheit's thermometer; or, in the absence of this instrument, till the face can be seen pretty distinctly in the water; then mix the malt with the water gradually, stirring it with a mashing stick, or other convenient spatula. Preserve a few handfuls of the dry malt to strew over the surface after it is mixed, in order to prevent as much as possible the escape of heat. The vat should also be covered with cloths, more effectually to keep the mixture hot, which must remain undisturbed for three hours. The wort is then to be run out by the spigot and faucet. As soon as it has done so, pour on again upon the malt the same quantity of water, cooled in a tub to the same degree of heat as before, and let it remain with the malt half an hour, or somewhat longer. Then let the wort run off a second time.

As you will now be enabled to judge how much more wort will be necessary to fill your cask, add as much more water, cooled down as before, as will be sufficient for the purpose, letting the last portion stand a short time in the vat, always remembering that for a cask of 18 gallons it is advisable to have at least 7 or 8 gallons of wort more than sufficient to fill the cask, to allow for waste and evaporation.

When the worts have all been run off, mix them together, and put them into the copper, making it boil as quickly as possible. When the wort is reduced by boiling to nearly the proper quantity, put in the one pound of hops, and let them boil in the wort for about twenty minutes, covering the copper over in the meantime to prevent the escape of the aroma of the hops. The boiling being completed, let the wort be strained off into proper coolers. When it is cooled down to 65 or 70 degrees, mix one quart of good yeast with a few gallons of the wort first, and afterwards put the whole together into a vat to ferment for two or three days or more; or put it at once into the cask, and let it ferment there.

The necessary care must be taken to watch the fermentation in the cask, and fill it up occasionally with the superfluous liquor. As soon as the cask will bear a bung in it, it ought to be stopped down slightly at first, till the power of the disengaged gas be ascertained, or otherwise the cask may burst. This ale, if it is brewed when the weather is mild, will be fit for drinking in about six weeks or two months.

To brew *Table Ale*, mix the first and second worts together, suffer it to ferment, and proceed in the same manner as before directed. If the ale is for present use, take three-quarters of a pound of hops to each bushel of malt; but if intended to be kept, take one pound of hops to each bushel of malt. It will be fit for use in about a week.

BRANDY.—The spirituous liquor produced by the distillation of wine only, and not from any other fermented body. But brandy consists not merely of the spirit drawn from wine, it contains also some water, and is flavored by the essential oil of the grape, which has been dissolved by the alcohol produced during fermentation. The average proportion of alcohol in brandy varies from 48 to 54 per cent. When pure, it is perfectly colorless, and only acquires a pale brown or yellow tint from the cask. When

brandy is first imported, it is generally 1 or 2 over proof, but its strength decreases with age; and by the time that it is usually taken from the bond-store for sale, it is seldom stronger than 3 or 4 under proof. The very finest brandies average from 5 to 10 under proof, and never exceed 2 under proof; they then contain more than half their weight of water, and from their boiling point being higher, they come over to this country more fully charged with essential oil, and the other volatile and fragrant principles of the grape; thus possessing, in a greater degree, that peculiar aroma and flavor for which they are so much esteemed. The compound known as *British brandy*, is made chiefly from malt spirit, with the addition of mineral acids, and various flavoring ingredients.

Wine, Mulled.—Boil some cloves, mace, cinnamon, and nutmeg, in about a quarter of a pint of water till well flavored with spice, then add it to a pint of port or home-made wine; sweeten to taste, and serve hot with thin toast or rusks. 2. Boil a small stick of cinnamon, a blade of mace, and three cloves, in a breakfast-cupful of water for a few minutes; add some grated nutmeg and a pint of home-made or port wine, sweeten to taste, boil for one minute, and serve hot. 3. Put a bottle of port wine, half a bottle of water, and sugar to taste, into a saucepan; then add allspice, cloves, and a blade of mace; boil all together, serve in a jug with grated nutmeg, and rusk or slips of thin toast. Some persons add lemon-juice to the mull, but it does not generally please.

Ginger Beer.—There are several recipes for making this beverage, the following being the best. 1. Lump sugar, 1 lb.; Jamaica ginger, well bruised, 1 oz.; cream of tartar, ¾ oz.; 2 lemons sliced; boiling water, 1 gallon. Macerate with frequent stirring in a covered vessel, until barely lukewarm, then add of yeast, 1½ or 2 ozs., and keep it in a moderately warm situation so as to excite a brisk fermentation; the next day rack the liquor and strain it through flannel; work for another day or two, according to the weather: then skim, or again strain, put it into bottles, and wire down the corks. 2. Loaf sugar, 5 lb.; lemon juice, 1 gill; honey, ¼ lb.; bruised ginger, 6 ozs.; water, 5 gallons. Boil the ginger in three quarts of the water for half an hour; then add the sugar, the juice, and the honey, with the remainder of the water, and strain through a cloth. When cold add the white of an egg and 2 drachms of essence of lemon; after standing three or four days, bottle it. 3. Take 1 lb. of bruised ginger and the rind of two lemons; boil 14 lbs. of loaf sugar and 1 lb. of raisins in 11 gallons of water, pour this over the bruised ginger and lemon-rind, and add the juice of 18 lemons. When at a lukewarm temperature, add two or three spoonfuls of yeast, and let it ferment for a day or so; then put it into a cask to finish the fermentation, and when that is completed, fine it, and bung it down closely. It may be bottled in stone bottles almost immediately. 4. *Quickly made:* pour a gallon of boiling water over ¾ lb. of loaf sugar; 1¼ oz. of sliced ginger, and the peel of 1 lemon; when milk-warm, add the juice of a lemon, and a spoonful of yeast.

Ginger Beer Powders.—1. Powdered loaf sugar, 4 ozs.; carbonate of soda, 5 drachms; powdered ginger, 1 drachm; mix these ingredients well together; divide into 12 equal parts, one of each of which put into a blue paper. Then take tartaric acid, 1 oz.; divide into 12 equal parts, and put each into a white paper. Dissolve the contents of one of the blue and one of the white papers, each in half a glass of spring water. Pour one upon the other, and drink while effervescing. 2. Powdered lump sugar, 2 drachms; carbonate of soda, ½ drachm; mix them together. Take of tartaric acid, ½ drachm; best ground ginger, 5 grains; essence of lemon, 1 drop; mix these together. Dissolve the above powders in separate tumblers, containing together about half a pint of spring water; when dissolved, mix the contents of each glass and let it be drunk immediately.

Sherry.—Wine-merchants distinguish several kinds of sherry, as pale and brown, and there are various degrees of each. Sherry in general is of an amber color, and when good it has a fine aromatic odor, with something

of the agreeable bitterness of the peach kernel. When new it is harsh and fiery, and requires to be mellowed in the wood for four or five years. Sherry is much in favor in England, as being a light, pleasant wine, and more suitable for general drinking than any other. Amontillado sherry is highly esteemed, being, when genuine, entirely devoid of brandy, and equally free from acid.

Sherry Cobbler.—Take some very fine and clean ice, break into small pieces, fill a tumbler to within an inch of the top, with it put a tablespoonful of plain syrup, capillaire, or any other flavor—some prefer strawberry—add the quarter of the zest of a lemon, and a few drops of the juice. Fill with sherry, stir it up, and let it stand for five or six minutes. Sip it gently through a straw.

Ottawa Root Beer.—Take 1 oz. each of sassafras, allspice, yellowdock and winter green; ½ oz. each wild cherry bark and coriander; ¼ oz. hops and 3 qts. molasses. Pour sufficient boiling water on the ingredients and let them stand 24 hours, filter the liquor, and add ½ pt. yeast, and it is ready for use in 24 hours.

A Rich and Pleasant Wine.—Take new cider from the press, mix it with as much honey as will support an egg, boil gently fifteen minutes, but not in an iron, brass, or copper pot. Skim it well. In March following, bottle it, and it will be fit to drink in six weeks; but will be less sweet if kept longer in the cask. You will have a rich and strong wine, and it will keep well. This will serve for any culinary purposes which sweet wine is directed for. Honey is a fine ingredient to assist and render palatable new, crabbed, austere cider.

Cherry Brandy.—Gather cherries when full ripe, pick them clear from refuse; mash them in a clean wooden vessel, and press out the juice through a horsehair bag. Let it stand two hours to settle; then strain the clear liquor through a flannel bag until it is perfectly fine; and to every quart of the juice put a quart of French brandy and three quarters of a pound of white sugar-candy, dissolved in as little pure cold water as possible. Mix them well, and put the whole into a clean stone jar, in which has been previously put the thin rinds of one or more lemons, according to the quantity; put in the cork, seal it, and let it stand in a warm room for two months. Strain it through a fine flannel bag until it is perfectly clear; then bottle it, seal the corks, and keep it twelve months longer.

Raisin Wine Equal to Sherry.—Boil the proper quantity of water and let it stand till cold. To each gal. of this add 4 lbs. of chopped raisins, previously well washed, and freed from stalks; let the whole stand for one month, stirring frequently; then remove the raisins, and bung up closely for one month more; then rack into another vessel, leaving all sediment behind, and repeat till it becomes fine; then to every 10 gals. add 6 lbs. of fine sugar, and 1 doz. of good oranges, the rinds being pared very thin, and infused in 2 qts. of brandy, which should be added to the liquor at its last racking. Let the whole stand three months in the cask, then bottle. It should remain bottled twelve months. To give it the flavor of Madeira, when it is in the cask, put in a couple of green citrons, and let them remain till the wine is bottled.

Port Wine.—Worked cider, 42 gals.; good port wine, 12 gals.; good brandy, 3 gals.; pure spirits, 6 gals.; mix. Elderberries and aloes, and the fruit of the black haws, make a fine purple color for wines, or use burnt sugar.

British Madeira.—Pale malt, 1 bushel; boiling water, 12 gals.; mash and strain; then add white sugar, 4 lbs.; yeast, 1 lb. Ferment, next add raisin or Cape wine, 3 qts.; brandy, 3 qts.; sherry, 2 qts.; port, 2 qts.; bung down. The malt may be mashed again for bottle beer.

Currant and other Fruit Wines.—To every gallon of expressed juice, add 2 gals. soft water, 6 lbs. brown sugar, cream tartar, 1½ ozs.; and 1 qt. brandy to every 6 gals; some prefer it without brandy. After fermentation, take 4 ozs. isinglass dissolved in 1 pt. of the wine, and put of each

barrel, which will fine and clear it; when it must be drawn into clean casks, or bottled, which is preferable.

Blackberry and Strawberry Wines are made by taking the above wine when made with port wine, and for every 10 gals. from 4 to 6 qts. of the fresh fruit, bruised and strained, are added, and let stand four days till the flavor is extracted; when bottling, add 3 or 4 broken raisins to each bottle.

Morella Wine.—To each quart of the expressed juice of the morella, or tame cherries, add 3 qts. water and 4 lbs. of coarse brown sugar; let them ferment, and skim till worked clear; then draw off, avoiding the sediment at the bottom. Bung up, or bottle, which is best for all wines, letting the bottles lie always on the side, either for wines or beers.

London Sherry.—Chopped raisins, 400 lbs.; soft water, 100 gals.; sugar, 45 lbs.; white tartar, 1 lb.; cider, 16 gals. Let them stand together in a close vessel one month; stir frequently. Then add of spirits, 6 gals.; wild cherries bruised, 8 lbs. Let them stand one month longer, and fine with isinglass.

English Patent Wine from Rhubarb.—To each gal. of juice, add 1 gal. soft water, in which 7 lbs. brown sugar have been dissolved; fill a keg or barrel with this proportion, leaving the bung out, and keep it filled with sweetened water as it works off, until clear. Any other vegetable extract may be used if this is not liked; then bung down or bottle as you please. The stalks will yield ¾ their weight in juice; fine and settle with isinglass as above. This wine will not lead to intemperance.

Various Wines.—To 28 gals. clarified cider add good brandy 1 gal.; crude tartar (this is what is deposited by grape wines), milk to settle it, 1 pt.; draw off 36 hours after thoroughly mixing.

Ginger Wine.—Put 1 oz. of good ginger-root bruised in 1 qt. 95 per cent. alcohol; let it stand nine days, and strain; add 4 qts. water, and 1 lb. white sugar dissolved in hot water, color with tincture of sanders to suit.

Another.—To 1 qt. 95 per cent. alcohol add 1 oz. best ginger-root (bruised but not ground), 5 grs. capsicum and 1 drachm tartaric acid. Let it stand one week and filter; now add 1 gal. water in which 1 lb. of crushed sugar has been boiled. Mix when cold. To make the color, boil ½ oz. cochineal, ¾ oz. cream tartar, ½ oz. saleratus, and ½ oz. alum, in 1 pt. of water till you get a bright red color.

Gooseberry Wine.—This wine may be made from either ripe or unripe gooseberries; in the former process, bruise ten gallons of ripe gooseberries in a tub, leave them in that state for twenty-four hours, then press the pulp through a hair-cloth or canvas bag; return the remaining pulp into the tub, and pour on it four gallons of hot water, stir this well up, leave it for twelve hours, and express the liquor as before. Mix the first and second liquors together, and throw away the exhausted pulp. To every four gallons of the mixed liquor add fourteen pounds of white sugar, or fifteen of moist; dissolve and mix this thoroughly with the liquor, and leave it to ferment. Should the weather be very cool place the liquor near the fire. As the fermentation proceeds, the liquor becomes less and less sweet, till at the completion of the fermentation the sweetness will have entirely disappeared, and consequently, the progress of the fermentation may be readily tested by tasting the liquor from time to time. When the fermentation has ceased, rack the wine off as clear as possible, and completely fill a cask with it; then bung it closely, and set it by in a cellar. Five years in the wood will not be any too long; at the end of this period it may be bottled, and will be in high perfection.

For *unripe Gooseberry Wine*.—Take eight gallons of green gooseberries, bruise them well, add eight gallons of cold water; let them stand for twenty-four hours, drain the liquor well from the gooseberries through a sieve put three pounds and a half of loaf sugar to every gallon of liquor; pour it into a cask, add a quart of the best gin; let it stand for six months then bottle it.—See Champagne, British.

STOMACH BITTERS EQUAL TO HOSTETTER'S.—European gentian root, 1½ oz.; orange peel, 2½ oz.; cinnamon, ¼ oz.; anise seed, ½ oz.; coriander seed, ½ oz.; cardamon seed, ⅛ oz.; unground Peruvian bark, ½ oz.; gum kino, ¼ oz.; bruise all these articles, and put them into the best alcohol, 1 pt.; let it stand a week, and pour off the clear tincture; then boil the dregs a few minutes in 1 qt. of water, strain and press out all the strength; now dissolve loaf sugar, 1 lb. in the hot liquid, adding 3 qts. cold water, and mix with the spirit tincture first poured off, or you can add these, and let it stand on the dregs if preferred.

BOKER'S BITTERS.—Rasped quassia, 1½ oz.; calamus, 1½ oz.; powdered catechu, 1½ oz.; cardamon, 1 oz.; dried orange peel, 2 oz.; macerate the above ten days in ½ gal. strong whiskey, and then filter, and add 2 gals. water; color with mallow or malva flowers.

STOUGHTON BITTERS.—Gentian, four ounces, orange peel, four ounces, Columbo, four ounces, camomile flowers, 4 ounces, quassia, 4 ounces, burned sugar, 1 lb., whisky, 2½ gals. Mix and let it stand 1 week. Bottle the clear liquor.

CHEAP CIDER.—Put in a cask 5 gals. hot water, 15 lbs. brown sugar; 1 gal. molasses, ½ gal. hop or brewer's yeast, good vinegar, 6 qts.; stir well, add 25 gals. cold water, and ferment.

ANOTHER CIDER.—Cold water, 20 gals., brown sugar, 15 lbs., tartaric acid ½ lb.; rummage well together, and add, if you have them, 3 or 4 lbs. of dried sour apples, or boil them and pour in the expressed juice. This cider will keep longer than the others.

CHAMPAGNE CIDER.—Good pale cider, 1 hhd.; spirits, 3 gals.; sugar. 20 lbs.; mix, and let it stand one fortnight; then fine with skimmed milk, ½ gal.; this will be very pale, and a similar article, when properly bottled and labelled, opens so brisk, that even good judges have mistaken it for genuine champagne.

CIDER WITHOUT APPLES.—Water, 1 gallon; common sugar, 1 lb.; tartaric acid, ½ oz.; yeast, 1 tablespoonful; shake well, make in the evening, and it will be fit to use next day.

FOR BOTTLING.—Put in a barrel, 5 gals. hot water; 30 lbs. common sugar; ¾ lb. tartaric acid; 25 gallons cold water; 3 pints of hop or brewers' yeast, worked into paste with 1 pint of water and 1 lb. flour. Let it work in the barrel forty-eight hours, the yeast running out of the bunghole all the time, putting in a little sweetened water occasionally to keep it full; then bottle, putting in two or three broken raisins to each bottle; and it will nearly equal champagne.

TO KEEP CIDER SWEET AND SWEETEN SOUR CIDER.—To keep cider perfect, take a keg and bore holes in the bottom of it; spread a piece of woollen cloth at the bottom; then fill with clean sand closely packed; draw your cider from a barrel just as fast as it will run through the sand; after this, put in clean barrels which have had a piece of cotton or linen cloth 2 by 7 inches dipped in melted sulphur and burned inside of them, thereby absorbing the sulphur fumes (this process will also sweeten sour cider): then keep it in a cellar or room where there is no fire, and add ½ lb. white mustard seed to each barrel. If cider is long made, or souring when you get it, about 1 qt. of hickory ashes (or a little more of other hard wood ashes) stirred into each barrel will sweeten and clarify it nearly equal to rectifying it as above; but if it is not rectified, it must be racked off to get clear of the pomace, as with this in it, it will sour. Oil or whisky barrels are best to put cider in, or ½ pint sweet oil to a barrel, or a gallon of whisky to a barrel, or both, may be added with decidedly good effects; isinglass, 4 oz to each barrel, helps to clarify and settle cider that is not to be rectified.

MALT WINE.—Boil thirty pounds of sugar with ten gallons of water for half an hour; skim the liquor well; set it by to cool; and when milkwarm, add five gallons of new ale; simmer the whole gently; let it cool; place it in a tub, and leave it to ferment for two days: at the end of that time, transfer it to a cask, with a pound of powdered sugar-candy, and four pounds

of raisins, chopped small; when the fermentation ceases, it may be racked and fined. It will be fit to bottle at the end of six or twelve months, and may be drunk two or three months afterwards.

Edinburgh Ale.—Employ the best pale malt—1st, mash, 2 barrels pr quarter, at 183°, mash three-quarters of an hour, let it stand 1 hour, and allow half an hour to run off the wort; 2d, mash, 1 barrel per quarter, 180°, mash three-fourths of an hour, let it stand about three-fourths, and tap as before; 3d mash, 1 barrel per quarter, at 170°, mash half an hour, let it stand half an hour, and tap as before. The first and second wort may be mixed together, boiling them about an hour or an hour and a quarter, with a quantity of hops proportioned to the time the ale is required to be kept. The first two may be mixed at the heat of 60°, in the glyetun, and the second should be fermented separately for small beer. The best hops should be used in the proportion of about 4 lbs. of every quarter of malt employed.

Bottling Porter.—Brown Stout. Pale malt, 2 quarters; amber and brown malt, of each 1½ do.; mash it 3 times, with 12, 7, and 6 barrels of water; boil with hops, 50 lbs; set with yeast, 29 lbs. Product, 17 barrels, or 1½ times the malt.

Anisette Cordial, 40 Gals.—Put in a barrel 13 gals. alcohol, 75 per cent. Dissolve 3½ oz. essence of green anise-seed in one gal. 95 per cent. alcohol, and add ½ gal. orange-flower water; 8 or 10 drops infusion of mace, and 5 drops essence of cinnamon. Then put in the barrel 26 gals. sugar syrup, 25 degrees Baumé; stir fifteen minutes, and let it rest four or five days; then filter. Add 2 or 3 sheets of filtering paper.

Curaçoa Cordial, 40 Gals.—Essence of bitter oranges, 2 oz.; essence of neroli, 2 oz.; essence of cinnamon, ¼ oz.; 3 drs. mace, infused in alcohol. Dissolve the above essence in 1 gal. alcohol, 95 per cent.; then put in a clean barrel 13 gals. alcohol, 85 per cent.; 26 gals. sugar syrup, 30 degrees Baumé; and add 1 gal. perfumed spirit as above. Color with saffron or turmeric.

Peppermint Cordial.—Good whiskey, 10 gal., water, 10 gals., white sugar, 10 lbs., oil peppermint, 1 ounce, in 1 pint alcohol, 1 lb. flour well worked in the fluid, ½ lb. burned sugar to color. Mix and let it stand one week before using. Other oil in place of peppermint, and you have any flavor desired.

Berlin Carraway Cordial.—Take 8 gals. spirit, 50 per cent.; 1 oz. oil of carraway, which you dissolve in spirit 95 per cent.; 8 lbs. sugar; 8 lbs. water. Dissolve your sugar in the water; mix, stir and filter.

Apple Water.—Slice two large apples, put them into a jar, and pour over them one pint of boiling water. Cover close for an hour; pour off the fluid, and sweeten if necessary.

Apple Tea.—Roast eight fine apples in the oven or before the fire; put them in a jug with two spoonfuls of sugar, and pour over them a quart of boiling water. Let the whole stand one hour near the fire.

Brandy Shrub.—Take thirty-four gallons of brandy, of proof strength, oil of orange, oil of lemon, each one ounce; dissolve the oils in one quart of alcohol; three hundred pounds of crushed sugar; dissolve by heat in twenty gallons of water; mix all well together by shaking or stirring, then add of a solution of citric acid sufficient to acidulate to the taste, then again shake or stir well for fifteen minutes; then add sufficient water to make one hundred gallons. Let stand until ready to draw off.

Rum Shrub.—Is much more esteemed, and is made in the same way, using only half instead of one ounce oil of lemon, and substituting a few gallons brandy for as much rum; a little extract vanilla, added after racking, is by some considered an improvement.

Currant Wine.—To every two gallons of water put five quarts of currants and a pint of raspberries. Let them soak for twelve hours, then squeeze and mash them thoroughly. On the following day rub them well on a fine wire sieve till all the juice is expressed, and wash the skins again with some of the liquor. To every gallon of juice put four pounds of

Lisbon sugar, tun it immediately, lay the bung lightly on, and leave the liquor to ferment. In two or three days, add brandy, in the proportion of a quart to every four gallons; then bung it close, but leave the vent peg out for a few days. Keep it in the cask for six months, and then bottle off.

Blackberry Wine.—Wash the berries, and pour 1 qt. of boiling water to each gal. Let the mixture stand 24 hours, stirring occasionally; then strain and measure into a keg, adding 2 lbs. sugar, and good rye whisky 1 pint, or best alcohol, ½ pint to each gal. Cork tight, and put away for use. The best wine that can be made.

Superior Raisin Wine.—Take 30 lbs. of chopped raisins free from stems and dust; put them in a large keg, add to them 10 gals. soft water; let them stand two weeks unbunged, shaking occasionally (warm place in winter), then strain through woollen, or filter; color with burnt sugar; bottle and cork well for use. The more raisins the better the wine, not exceeding 5 lbs. to each gallon.

Ottawa Beer and Ginger Ale.—Ottawa beer is made by using 8 ozs. of a fluid extract which contains the concentrated strength of 4 lbs. of 13 different roots and barks, added to 1 gal. syrup which is mixed with 14 gals. water, into which carbonic acid gas is forced at a pressure of 80 lbs. to the square inch. *Ginger Ale* is made in the same way except that 4 ozs. of extract is sufficient. When the ginger is really used, an extract deprived of resinous impurities is made use of, which gives a clear amber-colored drink.

Cheap Beer.—Water, 15 gals.; boil half the water with ¼ lb. hops; then add to the other half in the tun, and mix well with 1 gal. molasses and a little yeast.

Spruce and Ginger Beer.—Cold water, 10 gals.; boiling water, 11 gals.; mix in a barrel; add molasses, 30 lbs., or brown sugar, 24 lbs.; oil of spruce or any oil of which you wish the flavor, 1 oz.; add 1 pint yeast, ferment, bottle in two or three days. If you wish white spruce beer, use lump sugar; for ginger flavor, use 17 ozs. ginger root bruised, and a few hops; boil for thirty minutes in three gals. of the water, strain and mix well; let it stand two hours and bottle, using yeast, of course, as before.

Hop Beer, Very Fine.—Mix 14 lbs. of molasses and 11 gals. water well together, and boil them for 2 hours with 6 oz. hops. When quite cool, add a cupful of yeast, and stir it well by a gallon or two at a time. Let it ferment for 16 hours, in a tub covered with a sack, then put it in a 9-gallon cask, and keep it filled up; bung it down in 2 days, and in 7 days it will be fit to drink, and will be stronger than London porter.

Common Small Beer.—A handful of hops to a pail of water, a pint of bran, add half a pint of molasses, a cup of yeast, and a spoonful of ginger.

Table Beer.—Malt, 8 bushels; hops, 7 lbs; molasses, 25 lbs.; brew for 10 barrels; smaller quantity in proportion.

Ginger Beer.—Take 5½ gals. water, ¾ lb. ginger root bruised, tartaric acid, ½ oz., white sugar, 2½ lbs., whites of 3 eggs well beaten, 10 small teaspoonfuls of lemon ess.; yeast, 1 gill; boil the root for 30 minutes in 1 gal. of the water; strain off, and put the ess. in while hot; mix, make over night; in the morning, skim and bottle, keeping out the sediments.

Philadelphia Beer.—Take 30 gals. water, brown sugar, 20 lbs., ginger root bruised, ¼ lb., cream of tartar, 1¼ lb., carbonate of soda, 3 oz., oil of lemon, cut in a little alcohol, 1 teaspoonful, the white of 10 eggs well beaten, hops, 2 oz., yeast, 1 qt. The ginger root and hops should be boiled for twenty or thirty minutes in enough of the water to make all milk-warm; then strained into the rest and the yeast added and allowed to work itself clear; then bottle.

Lemon Beer.—To make 20 gals. boil 6 oz. of ginger root bruised, ¼ lb. cream of tartar, for 20 or 30 minutes, in 2 or 3 gals. water; this will be strained in 13 lbs. coffee sugar, on which you have put ½ oz. oil of lemon, and six good lemons squeezed up together, having warm water enough to

make the whole 20 gals. just so hot that you can hold your hand in it without burning, or about 70 degrees of heat; put in 1½ pints of hop or brewers' yeast, worked into paste with 5 or 6 oz. flour. Let it work over night, then strain and bottle for use.

Hop Beer.—Hops, 6 ounces; molasses, 5 quarts; boil the hops till the strength is out, strain them into a 30-gallon barrel; add the molasses and one teacupful of yeast, and fill up with water; shake it well, and leave the bung out till fermented, which will be in about 24 hours. Bung up, and it will be fit for use in about three days.

Root Beer.—Water 10 gals., heat to 60° Fah., then add 3 gals. molasses; let it stand 2 hours, pour it into a bowl and add powdered or bruised sassafras and wintergreen bark, of each ½ lb.; yeast 1 pt.; bruised sarsaparilla root, ½ lb.; add water enough to make 25 gals. in all. Ferment for 12 hours, then bottle.

Lemon Beer.—To a gallon of water add a sliced lemon, a spoonful of ginger, ½ a pint of yeast, and sugar enough to make it quite sweet.

Hop Beer.—Boil one handful of hops in one quart of water; strain it; add one teaspoon ginger, one pint of molasses, one pailful of lukewarm water, one penny's worth of yeast. Let it stand twenty-four hours; take off the scum and bottle it for use.

Molasses Beer.—Hops, 1 oz.; water, 1 gal.; boil for ten minutes, strain, add molasses, 1 lb.; and when luke-warm, yeast, 1 spoonful. Ferment.

To Restore Sour Beer.—Good hops, ¼ lb., powdered chalk, 2 lbs. Put in the hole of the cask, and bung close for a few days; for frosted beer, add some finings, a few handfuls of flour, and some scalded hops; for ropy beer, use a handful or two of flour, the same of hops, with a little powdered alum to each barrel. Rummage well.

To Improve the Flavor of Beer.—Bruised ginger, 1 oz.; bruised cloves, ½ oz.; a few scalded hops and a doz. broken coarse biscuits to every two barrels. Rummage well.

To Restore Flat Wine.—Add 4 or 5 gals. of sugar, honey, or bruised raisins to every 100 gals., and bung close; a little spirits may be added, to roughen; take bruised aloes, or powdered catechu, and add to the wine in suitable proportions, or add a small quantity of bruised berries of the mountain ash, to allay inordinate flatness. Let it stand 2 hours and bottle, using yeast, of course, as before.

White Wines are generally fined by isinglass in the proportion of 1½ oz. (dissolved in 1½ pts. of water, and thinned with some of the wine) to the hogshead. *Red Wines* are generally fined with the whites of eggs, in the proportion of 12 to 18 to each pipe; they must be well beaten to a froth with about 1 pt. of water, and afterwards mixed with a little of the wine, before adding them to the liquor. Rummage well.

Soda Water, Properties of.—The water properly so called, contains about twenty grains of bi-carbonate of soda to the half-pint, and is strongly impregnated with carbonic acid gas, but a good deal is made without the addition of soda at all. When used simply as a drink, this omission is unimportant, but not so when it is required as an antacid. As a drink in febrile disorders, soda-water is often beneficial and very grateful, but should not be given in too great quantities at once, otherwise the gas may produce unpleasant sensations. In such cases a small portion may be poured out, and the bottle after being opened, should be re-corked as speedily as possible; the cork should be secured by tying, and the bottle inverted in a jug of cold water; in this way the gas is preserved. Soda-water is an excellent vehicle for conveying milk to the stomach charged with acid, and consequently liable to feel oppressed by milk alone. The mode of application is, to heat nearly to boiling, a teacupful of milk, dissolve in it a teaspoonful of refined sugar, then put it into a large tumbler, and pour over it two-thirds of a bottle of soda-water.

Soda Water Powders.—A pleasant, cooling summer drink. The blue

paper contains carbonate of soda, thirty grains; the white paper, tartaric acid, twenty grains. Dissolve the contents of the blue paper in half a tumbler of water, stir in the other powder, and drink during effervescence. Soda powders furnish a saline beverage, which is very slightly laxative, and well calculated to allay the thirst in hot weather.

Soda Water, to Make.—Dissolve six drachms of dried carbonate of soda in a quart bottle of water, and four drachms and a half of tartaric acid in another bottle of the same size; pour out a wineglassful from each bottle, and throw them at the same time into a tumbler, when it will immediately effervesce. It should be drunk in this state. This is a good soda-water, and a dozen glasses thus prepared will cost but a very small sum. If ten drops of the muriated tincture of iron be put into the tumbler, a most excellent and agreeable tonic mineral water is produced, which strengthens the tone of the digestive organs in a very remarkable degree.—See Gazogene.

Cream Soda.—Loaf sugar, ten lbs., water, 3 gals.; warm gradually so as not to burn; good rich cream, 2 quarts; extract vanilla, 1½ ounces; extract nutmeg, ½ ounce; tartaric acid, 4 ounces. Just bring to a boiling heat; for if you cook it any length of time, it will crystallize; use 4 or 5 spoonfuls of this syrup instead of three, as in other syrups; put ½ teaspoonful of soda to a glass, if used without a fountain. For charged fountains no acid is used.

Bottled Soda Water without a Machine.—In each gallon of water to be used, carefully dissolve ¾ lb. crushed sugar, and one ounce of supercarbonate of soda; then fill pint bottles with this water, have your corks ready; now drop into each bottle ½ drachm of pulverized citric acid, and immediately cork, and tie down. Handle the bottles carefully, and keep cool until needed. More sugar may be added if desired.

Royal Pop.—Cream tartar, 1 lb., ginger, 1½ oz., white sugar, 7 lbs., essence of lemon, 1 drachm, water, 6 gals., yeast 1 pint. Tie the corks down.

Silver-top Drink.—Water, 3 qts., white sugar, 4 lbs., ess. of lemon, 4 teaspoonfuls, white of 5 eggs, beat with 1 tablespoonful of flour; boil to a syrup; then divide into equal parts, and to one add 3 ounces tartaric acid, to the other 4 ounces of carbonate of soda; put in a teaspoonful of each of the syrups, more or less (according to the size of the glass), to two-thirds of a glass of water; drink quick.

American Champagne.—Good cider (crab-apple cider is the best), 7 gals.; best fourth-proof brandy, 1 qt.; genuine champagne wine, 5 pts.; milk, 1 gal.; bitartrate of potassa, 2 oz. Mix, let stand a short time; bottle while fermenting. An excellent imitation.

British Champagne.—Loaf sugar, 56 lbs.; brown sugar (pale), 48 lbs.; water (warm), 45 gals.; white tartar, 4 oz.; mix, and at a proper temperature add yeast, 1 qt.; and afterwards sweet cider, 5 gals.; bruised wild cherries, 14 or 15 oz.; pale spirits, 1 gal.; orris-powder, ½ oz. Bottle while fermenting.

Sangaree.—Wine, ale, or porter, or two-thirds water, hot or cold, according to the season of the year, loaf sugar to taste, with nutmeg.

Curaçoa d'Hollande, 20 Gals.—Curaçoa orange-peel, 2 lbs.; ½ lb. Ceylon cinnamon. Let them soak in water; boil them for five minutes with the juice of 32 oranges and 14 gals. of plain white syrup; then add 6 gals. alcohol, 95 per cent.; strain, filter; color dark yellow with sugar coloring.

Half and Half.—In London, this drink is made by mixing half porter and half ale; in America, it is made by mixing half new and half old ale.

Apple Toddy.—One tablespoonful of fine white sugar, 1 wineglass of cider brandy, ½ of a baked apple. Fill the glass two-thirds full of boiling water, and grate a little nutmeg on top.

Apple Punch.—Lay in a china bowl slices of apples and lemons alternately, each layer being thickly strewed with powdered sugar. Pour over the fruit, when the bowl is half filled, a bottle of claret; cover, and let it stand for 6 hours. Then pour it through a muslin bag, and it is all ready.

Old Man's Milk.—One wine glass of port wine, 1 teaspoonful of sugar. Fill the tumbler one third full of hot milk.

Perfect Love.—One tablespoonful sugar, 1 piece each of orange and lemon peel. Fill the tumbler one-third full of shaved ice, and fill balance with wine; ornament in a tasty manner with berries in season; sip through a straw.

Ratafia.—Ratafia may be made with the juice of any fruit. Take 3 gals. cherry juice, and 4 lbs. sugar, which you dissolve in the juice; steep in 2½ gals. brandy ten days: 2 drachms cinnamon, 24 cloves; 16 ounces peach-leaves; 8 ounces bruised cherry kernels. Filter, mix both liquids, and filter again.

Arrack Punch Syrup.—53⅓ lbs. sugar; 3⅓ gals. water. Boil up well; then add 1⅔ gals. lemon-juice to the boiling sugar, and stir till the liquid is clear; pour it in a clean tub, and when nearly cool, add 5 gals. Batavia arrack, then filter.

Butyric Ether.—Is much used to impart a pine apple flavor to rum. Dissolved in 8 or 10 parts of alcohol, it forms the pine apple essence. From 20 to 25 drops of this essence, added to 1 lb. sugar, containing a little citric acid, imparts to the mixture a strong taste of pine apple.

Amylo-Acetic Ether.—Is a preparation of fruit-oil and other ingredients, and when diluted with alcohol, it is sold as *essence of Jargonelle pear*, and is used for flavoring different liquors. Fifteen parts amylo-acetic ether, with half a part of acetic ether, dissolved in 100 parts of alcohol, form what may be called the *Bergamot-pear essence*, which, when employed to flavor sugar, acidulated with a little citric acid, imparts the odor of the Bergamot pear, and a fruity, refreshing taste.

Pelargonate or Ethylic Ether.—(Pelargonic ether), has the agreeable odor of the quince, and when dissolved in alcohol in due proportion, forms the *quince essence.*

Acetate of Amylic Ether.—(Same as amylo ether), mixed with *butyric ether*, forms in alcoholic solution the *banana essence.*

Valerianate of Amylic Ether.—An alcoholic solution of this ether in the proportion of 1 part to 6 or 8 of alcohol, forms a flavoring liquid under the name of *apple essence.*

Portable Lemonade.—Tartaric acid, 1 ounce, white sugar, 2 lbs., ess. of lemon, quarter ounce; powder and keep dry for use. One dessert spoonful will make a glass of lemonade.

Lemonade.—White sugar, 1 lb., tartaric acid, ¼ ounce, essence of lemon, 30 drops, water, 3 qts. Mix.

Cider Nectar.—One qt. cider, 1 bottle soda water, 1 glass sherry, 1 small glass brandy, juice of half a lemon, peel of ½ of a lemon, sugar and nutmeg to taste. Flavor it with extract of pine apple, stain, and ice it all well.

Imperial Cream Nectar.—Part 1st., take 1 gallon water, loaf sugar, 6 lbs., tartaric acid, 6 ounces, gum arabic, 1 ounce. Part 2d, flour, 4 teaspoonfuls, the whites of 5 eggs; beat finely together; then add ½ pint water; when the first part is blood warm, put in the second; boil 3 minutes, and it is done. Directions: 3 tablespoonfuls of syrup to two-thirds of a glass of water; add one-third teaspoonful of carbonate of soda, made fine; stir well, and drink at your leisure.

Milk Punch.—One tablespoonful of fine white sugar, 2 ditto of water, 1 wine glass of Cognac brandy, ½ ditto Santa Cruz rum, ⅛ tumblerful of shaved ice; fill with milk. Shake the ingredients well together, and grate a little nutmeg on top. To make it hot, use *hot* milk and no ice.

Glasgow Punch.—Melt lump-sugar in cold water, with the juice of a couple of lemons, passed through a fine wire strainer; this is sherbet, and must be well mingled. Then add old Jamaica rum, one part of rum to five of sherbet. Cut a couple of lemons in two, and run each section rapidly around the edge of the jug or bowl, gently squeezing in some of the delicate acid, when all is ready.

CONFECTIONERY.

Manufacturing Ice Creams, Ices, Candies, &c., Clarifying Sugars.

Molasses Candy.—West Indian molasses, 1 gallon; brown sugar, 2 lbs; boil the molasses and sugar in a preserving kettle over a slow fire; when done enough it will cease boiling; stir frequently, and when nearly done, stir in the juice of four lemons or two teaspoonfuls of essence of lemon; afterwards butter a pan, and pour out.

Confectioners' Colors.—*Red*, cochineal, 4 oz.; boil 5 minutes in half pint water; then add cream tartar, 1 oz.; pounded alum, ½ oz.; boil 10 minutes longer, add sugar, 2 oz.; and bottle for use. *Blue*, put a little warm water on a plate, and rub in indigo till the required color is got. *Yellow*, rub with some water a little yellow gamboge on a plate, or infuse the heart of a yellow-lily flower with milk-warm water. *Green*, boil the leaves of spinach about 1 minute in a little water, and, when strained, bottle for use.

To Candy Sugar.—Dissolve 2 parts of double refined sugar in 1 of water. Great care must be taken that the syrup does not boil over, and that the sugar is not burnt. The first degree is called the thread, which is subdivided into the little and great thread; if you dip your finger in the syrup, and apply it to the thumb, the tenacity of the syrup will, on separating the finger and thumb, afford a thread which shortly breaks, this is the little thread; if the thread admits of a greater extension of finger and thumb, it is called the great thread; by longer boiling you obtain the pearl, which admits of being drawn without breaking by the utmost extension of finger and thumb; this makes candied sugar; by further boiling you obtain the *blow*, which is known by dipping a skimmer with holes in the syrup, and blowing through them; if bubbles are perceived, you have got the blow. The *feather* implies more numerous bubbles, and then the sugar will fly off like flakes while the skimmer is being tossed. By boiling longer, you obtain the *crack*; it will crack when broken, and does not stick to the teeth; dip a teaspoon into the sugar, and let it drop to the bottom of a pan of cold water. If the sugar remains hard, it has attained the degree termed *crack*.

Common Lemon Candy.—Take 3 lbs. coarse brown sugar; add to it three teacupfuls of water, and set over a slow fire for half an hour; put to it a little gum arabic dissolved in hot water; this is to clear it. Continue to take off the scum as long as any rises. When perfectly clear, try it by dipping a pipe-stem first into it and then into cold water, or by taking

a spoonful of it into a saucer ; if done, it will snap like glass. Flavor with essence of lemon and cut it into sticks.

Popped Corn, dipped in boiling molasses, and stuck together, forms an excellent candy.

Rock Candy.—To make fine rock candy, clarify double refined white sugar, filter it, and boil it till it is ready to crystallize, or boiled to a blister. The boiling sugar must measure 35° on the syrup weight, a degree more or less prevents its crystallization. Then take a brass kettle, of about 16 or 18 inches diameter and from 6 to 8 inches deep, smooth and polished on the inside. Make 8 or 10 small holes at equal distance from each other in a circle around the sides of the kettle, about 2 inches from the bottom; pass threads through these from one side to the other, and stop the holes on the outside with paste or paper to prevent the syrup from running out. Having thus prepared the kettle, pour in the syrup, till it rises about an inch above the threads; then place it in a stove moderately heated, and leave it to crystallize, agitating it from time to time. The crystallization will take place in six or seven days. As soon as the crystals are formed, pour off the remaining syrup, and throw in a little water to wash the crystals that are left at the bottom of the vessel. So soon as the mass is thoroughly drained set it in a very hot stove, leave it for two days, when it is fit for use. *Straw-colored* rock candy is made by substituting brown for loaf sugar. The syrup must be boiled over a very hot fire in order to render the candy perfectly white. The sides of the kettle should be sponged repeatedly during the boiling process, to prevent the sugar from adhering and burning.

Fine Horehound Candy.—Take a large bunch of the herb horehound, as green and fresh as you can get it. Cut it up (leaves and stalks) with scissors. Scald twice a China teapot or covered pitcher, and then put into it the horehound, pressing it down hard with your hands. The pot should be about two-thirds full of the herb. Then fill it up with boiling water. Cover it closely, and put a small roll of soft paper into the mouth of the spout, to prevent any of the strength escaping with the steam. Set the pot close to the fire to infuse, and keep it there till it comes to a hard boil. Then immediately take it away, and strain it into another vessel. Mix with the liquid sufficient powdered loaf sugar to make it very thick soft paste. Then put over the fire and give it a boil, stirring and skimming it well. Take a shallow, square tin pan, grease it slightly with sweet oil, and put into it the candy as soon as it is well boiled, smoothing it over the surface with a wet knife blade. Then sift on some powdered sugar. Set it away to cool. When nearly congealed, score it into squares. It is good for colds, and coughs, and hoarseness.

If you find it too thin, you may stir in, when it is nearly done boiling, a spoonful of flour, or arrow-root, or pulverized starch. Another way of making this candy is, to boil the horehound in as much water as will cover it, and till all the juice is extracted. Then strain it, and give it another boil, stirring in, gradually, sugar enough to make it very thick and stiff. Afterwards, sift sugar over a shallow tin pan, and fill it with the paste and leave it to congeal. Any herb candy may be made as above.

Clarified Sugar.—Break into large lumps as much loaf sugar as is required, and dissolve it in a bowl, allowing a pound of sugar to half a pint of water. Set it over the fire, and add the white of an egg well whipped. Let it boil up, and when about to run over, pour in a little cold water, to check it; but when it rises a second time, take it off the fire and set it by in a pan for a quarter of an hour. The foulness will then sink to the bottom, and leave a black scum on the top, which must be taken off gently with a skimmer. Then pour the syrup very quickly from the sediment, and set it by for use.

Clarified Syrup.—Break two pounds of double refined sugar, and put it into a stew-pan that is well tinned, with a pint of cold spring water. When the sugar is dissolved, set it over a moderate fire. Beat up half the

white of an egg, put it to the sugar before it gets warm, and stir it well together. As soon as it boils, take off the scum, and keep it boiling till it is perfectly clear. Run it through a clean napkin, put it into a close stopped bottle, and it will keep for months.

GINGER CANDY.—Dissolve 1 lb. double-refined sugar in ½ pint of spring water; set it over a clear fire, and let it boil to a thin syrup. Have ready a teaspoonful of powdered ginger, mix it smoothly with 2 or 3 spoonfuls of the syrup, then stir it gradually into the whole. Boil the mixture into a *flake*, watching it carefully, that it may not exceed this point; then add the freshly grated rind of a large lemon, and stir the sugar constantly and rapidly until it falls in a mass from the spoon, without sinking when dropped upon a plate. If boiled for a moment beyond the point, it will fall into a powder. Should this happen by mistake, add a little water, and boil to the proper consistency. Dip the candy from the kettle, and drop it in small cakes upon buttered pans, then set it away to cool.

GINGER CANDY.—Break a pound of loaf sugar into pieces, put it into a preserving pan, and pour over it about a third of a pint of spring water, let it stand until the sugar is nearly dissolved, then set over a perfectly clear fire, and boil it until it becomes a thin syrup. Have ready in a large cup a teaspoonful of powdered ginger; mix it smoothly and gradually with two or three spoonfuls of the syrup, and stir it well into the whole. Watch the mixture carefully, keep it stirred and drop it often from a spoon, to ascertain the exact point of boiling it has reached. When it begins to fall in flakes, throw in the freshly grated rind of a large lemon, and work the sugar round quickly as it is added. The candy must now be stirred constantly until it is done; this will be when it falls in a mass from the spoon and does not sink when placed in a small heap on a dish. It must be poured or ladled out as expeditiously as possible when ready, or it will fall into a mere powder. If this should happen, a little water may be added to it, and it must be reboiled to the requisite point. The candy if dropped in cakes upon sheets of very dry foolscap or other thick writing paper laid upon cold dishes, may be moved off without difficulty, while it is just warm, but it must not be touched while quite hot, or it will break.

CREAM CANDY.—To 3 lbs. white sugar add ½ pt. water, and set it over a slow fire for half an hour; then add a teaspoonful of gum arabic dissolved, and a tablespoonful of vinegar. Boil it till it is brittle, then take it off, and flavor it with vanilla, rose or orange. Rub the hands with sweet butter, and pull the candy till it is white; then twist or break it, or stretch it out into thin white strips, and cut it off.

RED VERDUN SUGARED ALMONDS.—Dry the almonds in a stove by a slow fire. When dry enough to snap between the teeth, put them into a swinging basin and gum them by throwing over them a little gum arabic solution, cold; swing them constantly till dry; then give them another coating of gum arabic mixed with 4 oz. sugar, and swing them again till dry, using no fire. When they are thoroughly dry, set them over a moderate fire. Dissolve some sugar in orange or rose water, not too thin, set it over the fire 2 or 3 minutes, strain it through a sieve, and pour it over the almonds in the basin. Swing them till they are thoroughly coated and dried; then add another coating, composed of two parts of carmine, one part of gum, and one part of sugar, and proceed as before. If the almonds are not perfectly covered, give them a coating in which there is considerable gum; and when thoroughly moistened, throw on them some sifted sugar, stir till the mixture is all absorbed, then add successive coatings of sugar till they are large enough, and put them into the stove to remain till next day, when in order to *whiten* them, you will proceed to boil 6 or 7 lbs. of fine clarified sugar to a blister, add 1 lb. of starch after taking it from the fire, stirring it constantly till a paste is formed a little thicker than that used for pastilles; a few drops of blue lake may be added to produce a pearl white. Put the almonds warm, into the swinging basin, add enough of the prepared sugar to coat them, swing the basin till they are nearly dry, then set on the

fire to finish the drying, then take the basin off the fire, heap them up in the middle, so as to allow the bottom of the vessel to cool; then add the coating of sugar, swing and dry them as before, and continue the process until four successive coatings of equal thickness have been given; then heat them well in the basin, put them into pans, and set them in the stove to remain over night. You will then proceed to *polish* them by giving them a coat of the prepared sugar and starch, and shake them violently until they are quite dry; give them another coating and proceed as before, and continue the process until they have received four successive coatings, when they will generally be found sufficiently polished. When the polishing is finished, put the almonds over a fire and stir gently, till all are thoroughly heated, then place in a stove till the next day in a wicker basket lined with paper.

Spanish Sugared Almonds—Make verdun sugared almonds about the size of pigeon's eggs, whiten and polish them by the previous directions, and paint different designs on them when completed.

Superfine Vanilla Sugared Almonds.—Proceed in the same manner as in the manufacture of verdun sugared almonds, make the solution of sugar in pure water; crush the essence of vanilla with a little sugar, and put in the solution.

Common Sugared Almonds.—Common almonds, 20 lbs.; sugar, 8 lbs.; farina, 20 lbs.; starch, 2 lbs. Heat the almonds in the swinging basin, when they boil, make them into a pulp with diluted starch; give first a warm, then a cold coating, cover them with farina, shaking the basin violently; then, when the almonds have been coated to the requisite size, spread them out on sieves; after a fortnight put them in a stove to finish drying: whiten them, and finish by the process described for the fine sugared almonds.

Candied Fruit.—Take one pound of the best loaf sugar; dip each lump into a bowl of water, and put the sugar into your preserving kettle. Boil it down, and skim it until perfectly clear, and in a candying state. When sufficiently boiled, have ready the fruits you wish to preserve. Large white grapes, oranges separated into small pieces, or preserved fruits, taken out of their syrup and dried, are very nice. Dip the fruits into the prepared sugar while it is hot; put them in a cold place: they will soon become hard.

Acid Drops.—Pound and sift into a clean pan 8 ozs. of double refined sugar, add slowly as much water as will render the sugar sufficiently moist not to stick to the stirring spoon, place the pan on a small stove or slow fire, and stir it till it nearly boils, remove from the fire and stir in ½ oz. tartaric acid. Place it on the fire for half a minute, then dip out small quantities from the pan, and let it fall in small drops on a clean tin plate; remove the drops in 2 hours with a knife. Ready for sale in 24 hours.

Chocolate Cream Candy.—Chocolate scraped fine, ½ oz.; thick cream, 1 pt.; best sugar, 3 ozs.; heat it nearly boiling, then remove it from the fire and mix it well; when cold, add the whites of 4 or 5 eggs; whisk rapidly and take up the froth on a sieve. Serve the cream in glasses and pile up the froth on top of them.

Orange Rock Candy is made by flavoring the syrup with a couple of teaspoonfuls of orange flower water, and coloring with saffron, just as the syrup is about to be taken from the fire. *Rose Rock Candy* is flavored with rose water, and colored with clarified carmine lake. *Vanilla Rock Candy* is perfumed with vanilla and colored with liquid violet. The degree of coloring may be tested by dropping a little of the colored syrup on a sheet of white paper.

Ice-Creams.—These are commonly composed of cream or sweetened water, variously flavored, and congealed by ice or a freezing mixture. Sometimes, instead of cream, the materials of a custard are used. The mixed ingredients are placed in a tin, furnished with a handle at top, called a freezer or freezing-pot, which is then plunged into a bucket containing salt and ice (ice broken small and mixed with half its weight of common salt), and is kept in rapid motion backwards and forwards until its contents are

frozen. As the cream congeals and adheres to the sides, it is broken down with the ice-spoon, so that the whole may be equally exposed to the cold. As the salt and ice in the tub melt, more is added until the process is finished. The ice-pot with the cream in it, is next placed in a leaden ice-stand, is at once surrounded with a mixture of ice and salt, and closely covered over. The glasses are filled from this as required for immediate use, and should have been previously made as cold as possible. Plain ice-cream is commonly made by one or other of the following formulæ: 1. New milk, 2 pints; eggs, 6 yolks; white sugar, 4 oz.; mix, strain, heat gently, and cool gradually. 2. Cream, 1 pint; sugar, 4 oz.; mix as before. 3. Cream, 1 pint; milk, 1 pint; white sugar, ½ lb.

Flavored ice-creams are made by mixing cream for icing with half its weight of mashed or preserved fruit, previously rubbed through a clean hair sieve; or, when the flavor depends on the juice of fruit or an essential oil, by adding a sufficient quantity of such substances.

Ice Cream.—Have rich, sweet cream, and a half pound of loaf-sugar to each quart of cream or milk. If you cannot get cream, the best imitation is to boil a soft custard, 6 eggs to each quart of milk (eggs well beat). Or another is made as follows: boil 1 quart of milk, and stir into it, while boiling, 1 tablespoonful of arrowroot wet with cold milk; when cool stir into it the yolk of 1 egg to give it a rich color. Five minutes' boiling is enough for either plan. Put the sugar in after they cool; keep the same proportions for any amount desired. Or thus: to 6 quarts of milk add ½ lb. Oswego starch, first dissolved, put the starch in 1 quart of the milk; then mix all together, and simmer a little (not boil); sweeten and flavor to your taste; excellent. The juice of strawberries or raspberries gives a beautiful color and flavor to ice-creams, or about ½ oz. essence or extract to 1 gallon or to suit the taste. Have your ice well broken, 1 qt. salt to a bucket of ice. About one hour's constant stirring, with occasional scraping down and beating together, will freeze it.

Chicago Ice Cream.—Irish moss soaked in warm water one hour, and rinsed well to cleanse it of sand and a certain foreign taste; then steep it in milk, keeping it just at the point of boiling or simmering for one hour, or until a rich yellow color is given to the milk; without cream or eggs; from 1 to 1½ oz. to a gal. only is necessary, and this will do to steep twice. Sweeten and flavor like other creams.

Substitute for Cream.—Take 2 or 3 whole eggs, beat them well up in a basin; then pour boiling hot tea over them; pour gradually to prevent curdling. It is difficult for the taste to distinguish it from rich cream.

Freezing Preparation.—Common sal-ammoniac, well pulverized, 1 part; saltpetre, 2 parts; mix well together. Then take common soda, well pulverized. To use, take equal quantities of these preparations (which must be kept separate and well covered previous to using) and put them in the freezing pot; add of water a proper quantity, and put in the article to be frozen in a proper vessel; cover up, and your wants will soon be supplied. For freezing cream or wines this cannot be beat.

Candied Lemon Peel.—Take lemon peels and boil them in syrup; then take them out, and dry.

Orange, Jasmine, and Clove Drops are made by mixing the above paste with these respective extracts:

For Salad Drops.—Water distilled from lettuce is used.

Saffron Drops.—Make an infusion of saffron, strain it, let it cool, use it to mix the paste, and proceed as before.

Heliotrope Drops.—Proceed in the same manner, flavoring the paste with a few drops of oil of neroli, or oil of orange, jasmine and tube-rose, and color violet.

Pink Drops.—Flavor the taste with tincture of red pinks, and color with carmine lake.

Cinnamon Drops.—Mix 5 drs. powdered cinnamon and 8 oz. of sugar with mucilage enough to make it into a paste, and proceed as above.

Chewing Gum.—Take of prepared balsam of tolu, 2 oz.; white sugar, 1 oz.; oatmeal, 3 oz.; soften the gum with water bath and mix in the ingredients; then roll in finely powdered sugar or flour to form sticks to suit.

Marshmallow and Licorice Drops are made the same way.

Rose Drops.—Mix the paste with rose water, and color with carmine lake. Proceed as above.

Lemon and Orange Drops.—Rasp off the yellow rind of an orange or lemon; mix the raspings with double-refined sugar; add 5 grs. of tartaric acid to every pound of sugar, color with yellow lake or saffron, and proceed as before. If too much acid is used, the candies will adhere to the sheet of tin.

Violet Drops.—Flavor the paste with tincture of Florence iris, and color with blue and carmine lakes. A few drops of tartaric acid may be added to sustain the blue.

Coffee Drops.—Substitute a strong, filtered infusion of coffee for water, in mixing the paste.

Chocolate Drops.—For every pound of sugar, take 5 pts. good chocolate, pulverize it, and mix it into a paste, as already directed, taking care not to boil the paste too long, lest it granulate, and become unfit for use.

Vanilla Drops.—Mix the paste with extract of vanilla, or finely-ground vanilla bean; to which add 2 oz. 3 grs. of tartaric acid, dissolved in water, to sustain the blue, without which it would disappear.

Imitation Currant Drops.—Mix the paste with water, adding a little essence of raspberry and of violet, or Florence iris, with a little tartaric acid dissolved in water; color with carmine, and proceed as above.

Peppermint Drops.—Dissolve finely-powdered sugar with a little strong peppermint-water in a saucepan with a spout. As soon as it is thoroughly dissolved, add an equal quantity of coarse-grained sugar with a few drops more of the peppermint, stir the whole for a few moments, then drop the mixture on paper, and dry it in the open air. In the same way are made lemon, rose, vanilla, and other drops. Citric and tartaric acid may be used to increase the acidity of lemon drops.

Extemporaneous Pastilles.—Make the paste as usual, without flavoring the water, drop the pastilles upon paper, leave them for two hours, then take them off and put them in the stove to dry. When wanted for use, put the quantity required into a large-mouthed jar, and flavor as desired. For instance, to make 2 lbs. of peppermint drops, take 5 pts. of sulphuric ether in which are diluted a few drops of essence of peppermint, and pour it over the candies, then cover the jar, and shake it until they are thoroughly moistened; then place them on a sieve, and set them in the stove for five minutes, evaporate the ether. In this manner rose, orange, lemon, jonquil, tube-rose, mignonette, clove, cinnamon, or any other drops may be made, dissolving their essential oils in sulphuric ether.

Ginger Candy Tablets.—Take 1 lb. loaf sugar, a few drops of acetic acid or the juice of half a lemon, a dessert-spoonful of essence of Jamaica ginger. Boil the sugar with just water enough to dissolve it to the ball degree, then add the acid and the essence, and rub the sugar with the back part of the bowl of a silver spoon up against the sides of the sugar-boiler to whiten or grain it sufficiently to give to the whole an opalized appearance; then pour it into very small-sized moulds, measuring half an inch or an inch oblong square, or else into a tin pan, the bottom part of which is marked out in small tablets, so that the candy may be easily broken into squares when dry. Smear the moulds slightly with oil of almonds. When the sugar is poured into the moulds, place in the screen for half an hour or more, to dry them hard.

Orange Flower Candy Tablets.—Ingredients: 1 lb. loaf sugar, a tablespoonful of orange-flower water, and a few drops of acetic acid. Proceed as directed in the preceding. No color.

Vanilla Candy Tablets.—Ingredients: 1 lb. loaf sugar, a few drops of essence of vanilla, sugar, and a few drops of acetic acid. Proceed as for ornaments in grained sugar.

Peppermint Candy Tablets.—Ingredients: 1 lb. of loaf sugar, a few drops of the essence of peppermint, and a few drops of acetic acid. Proceed as above. No color.

Lemon Drops.—Grate three large lemons, with a large piece of double-refined sugar; then scrape the sugar into a paste, add half a teaspoonful of flour, mix well, and beat it into a light paste with the white of an egg. Drop it upon white paper, and put them into a moderate oven on a tin plate.

Jellies Without Fruit.—To 1 pint of water put quarter oz. alum; boil a minute or two; then add 4 lbs. white sugar; continue the boiling a little; strain while hot; and, when cold, put in half a twenty-five cent bottle of extract of vanilla, strawberry, lemon, or any other flavor you desire for jelly.

Barberry Drops.—Mix the juice of ripe barberries with powdered and sifted loaf sugar till they become a soft paste; heat this over the fire, stirring it all the time, but not letting it boil. Remove from the fire, add a little more sugar, stir well, and deposit it in drops on a tin, or a sheet of paper. Dry the drops in a nearly cold oven.

Barley Sugar Drops.—Clarify and boil sugar as for barley sugar, and boil with it the thinly pared rinds of 1 or 2 lemons. Have ready a large sheet of white paper, covered with a uniform layer of sifted sugar. Pour out the boiled sugar in drops the size of a shilling; when cold, fold them separately in paper, and twist it at the ends.

Liquor Candy Tablets.—Ingredients: 1 lb. of loaf sugar, and a gill of any kind of liquor. Boil the sugar to the crack, then incorporate the liquor, and finish as in the preceding. No color.

Cinnamon Candy Drops.—Use 1 lb. loaf sugar, and a few drops essence of cinnamon. Proceed as in the last. This may be colored rose pink, the color is to be added while the sugar is boiling.

Clove Candy Tablets are prepared in the same way as the foregoing, essence of cloves being used instead of cinnamon.

Rose Candy Tablets.—Use 1 lb. loaf sugar, a few drops of essence of roses, a few drops of acetic acid, and a few drops of prepared cochineal. Proceed as in the preceding.

Fruit Candy Tablets.—Use 1 lb. of loaf sugar, ½ pint of the juice of any kind of fruit, either currants, cherries, strawberries, raspberries, &c., extracted by pressing with a spoon through a clean hair sieve. Boil the sugar to the crack, then incorporate the fruit juice by rubbing it with the sugar as directed in the preceding, and finish the candies as therein indicated.

To Free Molasses from its Sharp Taste, and to render it fit to be used instead of Sugar.—Take 24 lbs. molasses, 24 lbs. water, and 6 lbs. of charcoal, coarsely pulverized; mix them in a kettle, and boil the whole over a slow wood fire. When the mixture has boiled half an hour, pour it into a flat vessel, in order that the charcoal may subside to the bottom; then pour off the liquid, and place it over the fire once more, that the superfluous water may evaporate and the molasses be brought to its former consistence. 24 lbs. of molasses will produce 24 lbs. of syrup.

Peppermint Lozenges.—Ingredients: 1 oz. of picked gum tragacanth soaked with 5 oz. of tepid water in a gallipot (this takes some 6 hours), and afterwards squeezed and wrung through a cloth, about 1½ lbs. of fine icing sugar, and a teaspoonful of essence of peppermint. Work the prepared gum with the flattened fist on a very clean slab until it becomes perfectly white and elastic, then gradually work in the sugar, adding the peppermint when the paste has become a compact, smooth, elastic substance; a few drops of thick, wet, cobalt blue should also be added while working the paste, to give a brilliant whiteness. The paste thus prepared is to be rolled out with fine sugar dredged over the slab to the thickness of twopenny pieces, then if you possess a ribbed rolling pin, use to roll the paste again in cross directions, so as to imprint on its whole surface a small lozenge of diamond pattern. You now use your tin cutter to stamp out the lozenges; as you do so place them on sugar-powdered baking sheets to dry in the screen.

Ginger Lozenges.—Proceed as in the last; use a tablespoonful of essence of ginger, or 1 oz. of ground ginger to flavor, and a few drops of thick, wet gamboge to color the paste. *Horehound Lozenges.*—Ingredients: 1 oz. of gum dragon soaked in a gill of very strong extract of horehound, 1½ lbs. of fine icing sugar. Proceed as for the peppermint lozenges. *Cinnamon Lozenges* are prepared in the same manner as ginger or peppermint, with this difference only: a dessert-spoonful of essence of cinnamon is to be used in the flavoring of them, a few drops of thick, ground, wet-burnt umber should be used with a pinch of carmine to give the paste the tinge of cinnamon color. *Clove Lozenges.*—The same as peppermint lozenges, using essence of cloves for flavoring, and burnt umber to color the paste. *Orange Lozenges.*—Ingredients: 1 oz. prepared gum, 1½ lbs. sugar, 2 oz. of orange-sugar, the gum to be soaked in 2 oz. of orange flower water. Proceed as for peppermint lozenges. *Lemon Lozenges.*—Ingredients: 1 oz. prepared gum, 1½ lbs. of icing sugar, 2 oz. of lemon sugar, and a few drops of acetic acid. *Colt's foot Lozenges.*—Ingredients; 1 oz. gum dragon soaked in 2 oz. of orange flower water, 1½ lb. of fine icing sugar, and ½ oz. of essence of colt's foot. Proceed as for peppermint lozenges. *Cayenne and Catechu Lozenges.*—Ingredients: 1 oz. of gum dragon soaked in 2 oz. water, 2 lbs fine icing sugar, ½ oz. essence of cayenne, and ½ oz. of prepared catechu. Proceed as for peppermint lozenges.

Gum Pastilles, or Jujubes.—Ingredients: 1 lb. of picked gum arabic, 14 oz. of the finest sugar pounded and sifted, ¼ gill of double orange flower water, and 1 pt. tepid water to soak the gum in, which is afterwards to be strained off clean. Put the soaked and strained gum into a sugar boiler with the sugar, and use a clean spoon to stir it over a very moderate fire, while it boils and reduces to the small pearl degree; then add the orange flower water, stir all together on the fire, remove the preparation from the stove, skim off the froth, and use the mixture to cast the jujubes in levelled layers of starch powder contained in a flat box.

Superfine Chocolate Sugared Almonds.—Caraccasa cacao nuts, shelled and roasted, 20 lbs., Martinique sugar, 16 lbs., vanilla, 4 drs., starch, 10 oz. The same method is required as for the superfine vanilla sugar plums, but care must be taken in adding the coatings of gum, to touch the cacao nuts lightly, as they are very easily broken.

Superfine Sugared Filberts.—Filberts, 50 lbs., sugar, 4 lbs., starch, 4 oz. Employ the same process as for sugared almonds and flavor to taste. Rose water is generally preferred on account of its color and fragrance.

Coriander Sugar Plums.—Coriander, 2 lbs., farina, 30 lbs., sugar, 14 lbs. The washings of the basin are added to the coriander and farina without making a paste, and the method is followed that has been prescribed for the common sugared almonds; 8 lbs. of sugar are used to whiten them, and 6 to polish them; color after being polished with carmine, Prussian blue, and saffron.

Coriander in Bottles.—Coriander, 10 lbs., farina, 10 lbs., sugar for the whitening, 3 lbs., starch 1 lb. These are simply colored, and do not require brilliancy. They are made of the size of small peas, and are put into little bottles. In making these follow the receipt for common sugared almonds.

Anise-seed Sugar Plums.—Dry 2 lbs. green anise-seed in the stove; rub it in the hands to break off the stems, winnow to rid of dust, then put it in a swinging basin, and coat it with sugar boiled to a thread, so as to render the candies hard and brittle. When coated sufficiently, whiten and polish them, like the verdun sugared almonds. They vary in size, being generally as large as a pea.

Mint Sugar Plums.—Dry some peppermint seed in a stove and coat it in the same manner as anise-seed (it must not, however, be whiter than rape seed), whiten and finish like anise-seed. The first coating is sometimes composed of equal parts of peppermint and sugar.

Common Twist Candy.—Clarify 3 lbs. of common brown sugar, and boil it

till it is brittle, take it from the fire, pour it in buttered pans; rub the hands with a little butter, and as soon as it is cooled, pull it as you would molasses candy until it is perfectly white; then twist and braid it and cut it into sticks.

Caramel is made by boiling clarified sugar till it is very brittle, then pouring it on an oiled slab or sheet of tin, and, as soon as it is cool enough to receive an impression with the finger, stamping it in small squares, about an inch in size, with a caramel mould; then turning over the mass, wiping the bottom to remove any oil that may have adhered from the slab, and putting it in a dry place to harden. If you have no caramel mould, you may score it on the slab with a common case knife, after which they are glazed with another coating with sugar. Keep them tightly closed from the air after they are made.

Lemon Caramel is made by grating the yellow rind of a lemon with a lump of sugar; add to this a few drops of lemon juice with water enough to dissolve the sugar completely, and stir the whole into the boiled syrup a few minutes before it is taken from the fire. *Orange* and *Lime* caramels are prepared in the same manner from these respective fruits. *Coffee caramel*, coffee, 2 oz., sugar, 1 lb. Make an infusion of the coffee, using as little water as possible; strain it through a cloth, and stir it gradually into the boiled syrup a few minutes before taking it from the fire. *Chocolate caramel*, chocolate, 4 oz., sugar, 1 lb. Dissolve the chocolate in as little water as possible, and add it to the boiled sugar, as in the coffee caramels. *Vanilla* and *Orange cream caramels* are made by using the respective essences of these fruits.

Cocoa Nut Candy.—Pare and cut cocoa-nut into slips, or grate on a coarse grater the white meat of cocoa-nuts until you have ½ a lb.; dissolve ½ a lb. of loaf sugar in 2 tablespoonfuls of water; put it over the fire, and, as soon as it boils, stir in the cocoa-nut. Continue to stir it until it is boiled to a flake, then pour it on a buttered pan or marble slab, and cut in whatever forms you wish, when it is nearly cold. Lemon or other flavors may be added.

Candy Drops or Pastilles.—Pound and sift double-refined sugar, first through a coarse, and then through a fine sieve. Put the sugar into an earthen vessel, and dilute it with the flavoring extract, mixed with a little water. If too liquid, the syrup will be too thin, and the drops will run together; while if too thick, the syrup will be too compact, and cannot be poured out easily. When the sugar is mixed in a rather stiff paste, put it in a small saucepan with a spout and set it over the fire. As soon as it begins to bubble up the sides of the saucepan, stir it once in the middle, take it from the fire, and drop it in small lumps, of the size and shape required, upon sheets of tin, to stand for two hours, then put them in the stove to finish drying. As soon as they are perfectly hard and brilliant, take them from the fire, otherwise they will lose their aroma. Color the syrup just before taking it from the fire.

Spanish Licorice Jujubes.—Ingredients: 1 lb. picked gum arabic, 14 oz. of sugar, and 2 oz. of Spanish licorice dissolved in a gill of hot water, and afterwards strained clean. First prepare the gum and boil it with sugar as directed in the preceding article, and when reduced by boiling to the small pearl degree, incorporate the prepared Spanish licorice with it, remove the scum from the surface, and finish the jujubes in the manner indicated above. *Raspberry Jujubes.* Ingredients: 1 lb. picked gum arabic soaked in 1 pint of hot water and afterwards strained. 14 oz. of sugar, 1 gill of filtered raspberry juice, and a few drops of cochineal. Proceed as directed in the foregoing case, adding the raspberry and coloring last. *Black Currant Jujubes.* Proceed in all respects as indicated for raspberry jujubes omitting the cochineal, black currant juice being used. *Red Currant Jujubes.* —The same as black currant jujubes, red currant juice being used and a few drops of cochineal. *Ordinary Jujubes.* Ingredient: 1 lb. gum arabic soaked in 1 pt. of hot water and afterwards strained, 14 oz. sugar, ½ oz.

essence of roses, and a few drops of prepared cochineal. Let the mixture be prepared as for other jujubes, but instead of casting them in impressions made in starchpowder, when the preparation is ready, pour it into a very clean smooth tinned baking sheet to the depth of a quarter of an inch, and set it to dry in the screen, or hot closet (moderate heat); when sufficiently dried, so that on pressing the surface it proves somewhat elastic to the touch, remove it from the heat, and allow it to become cold; the sheet of jujube may then be easily detached, and is to be cut up with scissors in the shape of diamonds.

Stick Apple Sugar.—Boil the sugar to caramel, flavor with apple juice together with tartaric or other acid, pour it on a marble slab, draw it into sticks, cut them of equal length, then roll them on a slab till they are perfectly cold; when finished, wrap them in tissue-paper and put them in fancy envelopes.

Currant and Raspberry Paste Drops.—Ingredients: 1 lb. of pulp (the currants and raspberries in equal proportions boiled, and afterwards rubbed through a sieve), 1 lb. of sifted sugar. Stir both together in a copper sugar-boiler or preserving pan over a brisk fire, until the paste becomes sufficiently reduced to show the bottom of the preserving pan as you draw the spoon across it; then proceed to lay out the drops about the size of a half dollar, using a spouted sugar boiler for the purpose. The drops should then be placed in the screen to dry, at a low heat for an hour or so. When the drops are dry, use a thin knife to remove them from the tin sheet on which you laid them out, and put them away between sheets of paper in closed boxes, in a dry place. *Damson Paste Drops.*—Ingredients: 1 lb. of damson thick pulp, 1 lb. bruised sugar. Stir the pulp and sugar on the fire until reduced to a thick paste, then proceed to lay out the drops on square sheets of polished tin; dry them in the screen (moderate heat), and remove them in the manner aforesaid. These drops may be prepared with all kinds of plums and also with gooseberries. *Pear Paste Drops,*—Use 1 lb. pear pulp (made by peeling the pears and boiling them to a pulp with ½ pt. of cider or perry, and rubbing this through a coarse sieve), 1 lb. of bruised sugar. Proceed as for damson paste. *Apple Paste Drops.*—Use 1 lb. of apple pulp (made by peeling, slicing and boiling the apples with ½ pt. cider), 1 lb. of bruised sugar. Proceed as in the foregoing cases, adding a few drops of cochineal to half of the paste for the sake of variety. *Pine Apple Paste Drops.*—Use 1 lb. of pine-apple pulp (made by first peeling, and then grating the pine-apple on a dish, using a clean coarse tin grater for the purpose), 1 lb. of bruised sugar. Proceed as in the former cases.

Vases, Baskets, Figures, Animals, &c., in Grained Sugar.—The sugar being boiled to the ball degree, add a few drops of acetic acid, and work the sugar with the back part of the bowl of a silver tablespoon up against the side of the sugar boiler, fetching up the whole in turns, so that every portion may acquire an opalized or whitish color. As soon as the sugar has been worked up to this state, which constitutes "graining," pour it immediately into the ready prepared mould; and when it has become perfectly set firm in the centre, you may turn the vase, basket, animal, or whatever the object may be, out of its mould, and place it in the screen or hot closet to dry, at a *very* moderate heat. Afterwards they may be painted in colors to imitate nature.

Everton Taffy.—To make this favorite and wholesome candy, take 1½ pounds of moist sugar, 3 ounces of butter, a teacup and a half of water, and one lemon. Boil the sugar, butter, water, and half the rind of the lemon together; and, when done,—which will be known by dropping into cold water, when it should be quite crisp,— let it stand aside till the boiling has ceased, and then stir in the juice of the lemon. Butter a dish, and pour it in about a quarter of an inch in thickness. The fire must be quick, and the taffy stirred all the time.

To Preserve Fruits Without Sugar.—Fill some stone widemouthed bottles with the fruit carefully picked and set them in a copper or large

kettle; then fill the kettle with cold water nearly up to the mouths of the bottles. Corks should be prepared to fit the bottles, and a cloth should be put under the bottoms of the bottles to prevent their cracking with the heat. Light the fire under the kettle, and heat the water to 160° or 170°. This heat should be continued for half an hour, when the fruit will be sufficiently scalded; after that, fill up the bottles with boiling water to within an inch of the cork and cork them tightly. Lay the bottles on their sides; change the position of the bottles once or twice a week during the first two months, turning them round to prevent any fermentation that might take place. Fruits could also be kept by the process mentioned above for meats, remembering that they are to be scalded only, not boiled, as in the case with meats.

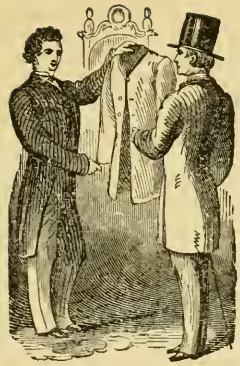
Another Method.—After paring and coring, put among them sufficient sugar to make them palatable for present eating, about 3 or 4 lbs. only to each bushel; let them stand awhile to dissolve the sugar, not using any water; then heat to a boil, and continue the boiling with care for 20 to 30 minutes, or sufficiently long to heat them through, which expels the air. Have ready a kettle of hot water, into which dip the can or bottle long enough to heat it; then fill in the fruit while hot, corking it immediately, dipping the end of the cork into the bottle-wax preparation described elsewhere.

To Preserve Fruit Juice without Heat.—Ingredients: 10 lbs. of fresh-gathered, picked, red-ripe currants, or other fruit, 2 qts. cold water, 5 oz. tartaric acid, 6 lbs. of coarse sifted sugar. Put the fruit into a large earthen pan, pour the water with the tartaric acid dissolved in it over the fruit, cover the pan with some kind of lid, and allow the whole to steep for 24 hours in a *cold* place, and it would be all the better if the pan containing the fruit could be immersed in rough ice.—Next, pour the steeped fruit into a suspended stout flannel bag, and when all the juice has run through, tie up the open end of the bag, and place it on a large earthen dish, with another dish upon it; place a half-hundred weight upon this, to press out all the remaining juice, and then mix it with the other juice. You now put the sifted sugar into the juice, and stir both together occasionally, until the sugar is dissolved, and then bottle up the syrup, cork, and tie down the bottles with wire, and keep them in the ice well or in a cold cellar, in a reclining position.

Syrup.—A saturated, or nearly saturated, solution of sugar in water, either simple, flavored, or medicated. In the preparation of syrups, care should be taken to employ the best refined sugar, and either distilled water or filtered rain water; by which they will be rendered much less liable to spontaneous decomposition, and will be perfectly transparent without the trouble of clarification. When inferior sugar is employed, clarification is always necessary. This is best done by dissolving the sugar in the water, or other aqueous dissolvent, in the cold, and then beating up a little of the cold syrup with some white of egg, and an ounce or two of cold water, until the mixture froths well. This must be added to the syrup in the boiler, and the whole whisked up to a good froth. Heat should now be applied, and the scum which forms removed from time to time with a clean skimmer. As soon as the syrup begins to slightly simmer, it must be removed from the fire, and allowed to stand until it has cooled a little, when it should be again skimmed, if necessary, and then passed through clean flannel. When vegetable infusions or solutions enter into the composition of syrups, they should be rendered perfectly transparent by filtration or clarification before being added to the sugar. The proper quantity of sugar for syrups will, in general, be found to be two pounds to every imperial pint of water or thin aqueous fluid. These proportions, allowing for the water that is lost by evaporation during the process, are those best calculated to produce a syrup of the proper consistence, and possessing good keeping qualities In the preparation of syrup, it is of the greatest importance to employ as little heat as possible, as a solution of sugar, even when kept at the temper-

ature of boiling water, undergoes slow decomposition. A good plan is to pour the water, cold over the sugar, and to allow the two to remain together for a few hours, in a covered vessel, occasionally stirring, and then to apply a gentle heat (preferably that of steam or a water-bath), to finish the solution. It is erroneously thought by some persons that a syrup cannot be properly prepared unless it is well boiled; but if this method be adopted, the ebullition should only be of the gentlest kind, and should be checked after the lapse of one or two minutes. When it is necessary to thicken a syrup by boiling, a few fragments of glass should be introduced, in order to lower the boiling point. To make highly transparent syrups, the sugar should be in a single lump, and by preference taken from the bottom or broad end of the loaf; as, when taken from the end, or if it be powdered or bruised, the syrup will be more or less cloudy. Syrups are judged to be sufficiently boiled when some taken up in a spoon pours out like oil; or, a drop cooled on the thumb-nail, gives a proper thread when touched. When a thin skin appears on blowing the syrup, it is judged to be completely saturated. The practice of completely saturating the water with sugar is a bad one. Under ordinary circumstances, a syrup with a very slight excess of water keeps better than one fully saturated. In the latter case, a portion of sugar generally crystallizes out on standing, and thus, by extracting sugar from the remainder of the syrup, so weakens it, that it rapidly ferments and spoils. This change proceeds at a rapidity proportionate to the temperature. Saturated syrup, kept in a vessel that is frequently uncorked, or exposed to the air, soon loses sufficient water, by evaporation from its surface, to cause the formation of minute crystals of sugar, which, falling to the bottom of the vessel, continue to increase in size at the expense of the sugar in the solution. On the other hand, syrups containing too much water also rapidly ferment, and become acescent; but of the two, this is the lesser evil, and may be more easily prevented. The preservation of syrups is best promoted by keeping them in a moderately cool, but not very cold place. They are better kept in small rather than in large bottles, as the longer a bottle lasts the more frequently it will be opened, and, consequently, the more it will be exposed to the air. By bottling syrups while boiling hot, and immediately corking down and tying the bottles over with bladder, perfectly air-tight, they may be preserved, even at a summer heat, for years without fermenting or losing their transparency. The crystallization of syrup, unless it be over-saturated with sugar, may be prevented by the addition of a little acetic or citric acid. The fermentation of syrups may be effectually prevented by the addition of a little sulphite of potassa or of lime. Fermenting syrups may be immediately restored by exposing the vessel containing them to the temperature of boiling water. In making the above additions to syrup, care must be had not to mix incompatible substances. Thus, in general, the two methods referred to cannot be practised together.

Sugar, to Clarify.—To every three pounds of loaf sugar, allow the beaten white of one egg, and a pint and a half of water; break the sugar small, put it into a nicely-cleaned brass pan, and pour the water over it; let it stand some time before it be put upon the fire, then add the beaten whites of the eggs; stir it till the sugar be entirely dissolved, and when it boils up, pour in a quarter of a pint of cold water, let it boil up a second time, take it off the fire, and let it settle for fifteen minutes; carefully take off all the scum, put it on the fire, and boil it till sufficiently thick, or if required, till candy high, in order to ascertain which, drop a little from a spoon into a small jar of cold water, and if it becomes quite hard, it is then sufficiently done; or dip the spoon into the sugar, plunge it into cold water, draw off the sugar which adheres to the spoon, and if it be hard and snaps, the fruit to be preserved must be instantly put in and boiled.



DYING, BLEACHING AND RENOVATING.

For Tailors, Milliners, Scourers, Dyers, Laundries, Hatters, Lace Manufacturers, and Home Use.

Lace, to Clean.—*For point lace.* Fix the lace in a prepared tent, draw it straight, make a warm lather of Castile soap, and, with a fine brush dipped in, rub over the point gently; and when it is clean on one side, do the same to the other; then throw some clean water on it, in which a little alum has been dissolved, to take off the suds; and having some thin starch, go over with the same on the wrong side, and iron it on the same side when dry; then open it with a bodkin, and set it in order. To clean point lace, if not very dirty, without washing: fix it in a tent as the former, and go over with fine bread, the crust being pared off; and when it is done, dust out the crumbs, &c. *For white silk lace or blonde.* Take a black bottle covered with clean linen or muslin, and wind the blonde round it, securing the ends with a needle and thread, not leaving the edge outward, but covering it as you proceed. Set the bottle upright in a strong cold lather of white soap and very clear soft water, and place it in the sun, having gently with your hand rubbed the suds up and down on the lace. Keep it in the sun every day for a week, changing the lather daily, and always rubbing it slightly when the suds are renewed. At the end of the week take the blonde off the bottle, and pin it backward and forward on a large pillow, covered with a clean tight case. Every scollop must have a separate pin; or more, if the scollops are not very small. The plain edge must be pinned down also, so as to make it straight and even. The pins should be of the smallest size. When quite dry, take it off, but do not starch, iron, or mess it. Lay it in long loose folds, and put it away in a pasteboard box. *To wash thread lace.* Rip off the lace, carefully pick out the loose bits of thread, and roll the lace very smoothly and securely round a clean black bottle, previously covered with old white linen, sewed tightly on. Tack each end of the lace with a needle and thread, to keep it smooth; and be careful in wrapping not to crumple or fold in any of the scollops or pearlings. After the lace is on the bottle, take some of the best sweet oil, and with a clean sponge wet the lace thoroughly to its inmost folds. Have ready in a wash-kettle a strong cold lather of clean water and white Castile soap. Fill the bottle with cold water, to prevent it bursting, cork it well, and stand it upright in the suds, with a string round the neck, secured to the ears or handle of the kettle, to prevent its rolling about or breaking

while over the fire. Let it boil in the suds for an hour or more, till the lace is clean and white all through. Drain off the suds, and dry it on the bottle in the sun; when dry, remove the lace from the bottle, and roll it round a wide ribbon block; or lay it in long folds, place it within a sheet of smooth white paper, and press it in a large book for a few days.

Veil, White Lace, to Wash.—Put the veil into a strong lather of white soap and very clear water, and let it simmer slowly for a quarter of an hour. Take it out and squeeze it well, but be sure not to rub it. Rinse it in two cold waters, with a drop or two of liquid blue in the last. Have ready some very clear and weak gum arabic water, or some thin starch, or rice-water. Pass the veil through it, and clear it by clapping. Then stretch it out even, and put it to dry on a linen cloth making the edge as straight as possible, opening out all the scollops, and fastening each with pins. When dry, lay a piece of thin muslin smoothly over it, and iron it on the wrong side.

Flannel, Properties of.—As an article of clothing, flannel is superior to any other, both for personal comfort and the preservation of health. When worn as underclothing its advantages are numerous and important. It acts on the surface of the skin, and exercises the most beneficial action, by keeping the pores clean and in a state most favorable to perspiration. It has also the advantage of absorbing the perspiration as soon as emitted, and allowing its watery portion to pass off into the atmosphere almost as soon as formed. Thus, persons who wear flannel next their skin, seldom catch cold from changes of temperature, even though perspiring profusely. In a variable climate every person should wear flannel, not only in the colder season, but throughout the year; the substance of the material being regulated according to the coolness or mildness of the season. In fact, flannel is required even more in summer than in winter, because persons perspire more freely in warm than in cold weather, and are consequently more susceptible of cold; while at that period of the year their clothing is less capable of protecting them from the effects of sudden changes of temperature. Flannel clothing should be removed at night upon going to bed, otherwise the body does not receive the due amount of warmth and comfort from it during the day. Some persons imagine that flannel may be worn with impunity for an extraordinary length of time without changing; but this is an error, as flannel in time, from the repeated absorptions of perspiration which it undergoes, has a species of incrustation forming on its surface, which impedes rather than assists the operation of the pores, and creates considerable irritation of the skin. Flannels, therefore, for the purposes of health and cleanliness, should be changed once a week. Flannel is sometimes objected to from the irritation it causes when first worn, and for this trifling inconvenience is often discarded after a few hours trial. This may in part be obviated by turning the flannel, and wearing the smooth and outer surface next the skin.

Flannel, to Clean and Preserve.—*To wash flannel.*—Take half the weight of soda that there is of soap, boil them with water, allowing a gallon to every pound of soap, and use it when perfectly cold. Wet the flannel in cold water, then wash it in fresh cold water, with some of the boiled mixture amongst it; wash them in this, changing the water till the flannel becomes perfectly clean; then rinse it well in cold water, and dry it in the shade. *To scour flannels.*—Slice half a pound of yellow soap, and dissolve it in boiling water, so as to make it of the thickness of oil; cover the flannels with warm water, add a lump of pearlash, and about one-third of the soap solution; beat them till no head rises on the water; then pour it off, and proceed as before with hotter water, without pearlash. *To prevent flannels from shrinking.*—Put them on the occasion of the first washing into a pailful of boiling water, and let them lie till cold. *To preserve the color of flannels.*—Mix four tablespoonfuls of flour with four quarts of water, and let it boil, stirring the whole time. When it has boiled thoroughly, put the flannel articles that are to be washed into a pan or tub, and pour

over them half the quantity of the mixture in a boiling state. When the water has become cool enough to hold the hand in it, wash the flannels in the usual way, but without the addition of soap; then rinse in three or four waters, and having let them drain as much as possible, put them back into the tub or pan, and pour over them the remaining flour and water in the boiling state. When cool enough, wash them as before; rinse well, and lay them out to dry without wringing.

Linen.—This well-known article of wearing apparel, and general domestic use, is made in every variety of quality, from the coarsest to the finest. It is difficult to give directions for judging of the fineness of linen, the best guide being furnished by the comparison of one quality with another, and bearing in mind the peculiar characteristics of each. One of the most striking properties of this material is, that it is a non-conductor of heat, and therefore it is better adapted for summer wear than for winter use. Yet even in this capacity it must be adopted with caution, and with delicate persons, especially, it should never be worn immediately next to the skin, the reason being that the perspiration, instead of being passed off through the fabric, as with cotton, remains on the inner surface and by interrupting the free action of the pores, creates that cold and clammy sensation, which is as disagreeable to the feelings as it is injurious to the health. For external articles of clothing, however, linen will be found a cool and agreeable wear during the hot summer months; thus, a linen jacket, or linen bonnet or cap, by its non-conducting properties, is enabled to resist the heat of the sun which is brought in contact with it, and to prevent its penetrating inwards to the body or the head. The cool and soothing nature of linen renders it especially well adapted for binding up wounds or applying to sores, and neither cotton nor any other material should be used when this can be obtained. For this purpose every housewife should always have a store of linen rags deposited in some accessible place, and in a fit condition to apply immediately, so that they may be used upon an emergency.

Linen, Preservation of.—When linen is well dried, and laid by for use, the chief precaution to attend to for its preservation, is, to secure it from damp and insects. The former is effected by placing the linen in wardrobes, drawers, or boxes situated in apartments which are naturally dry, and which have fires occasionally lighted in them; the ravages of insects may be prevented by the use of a judicious mixture of aromatic shrubs and flowers, cut up and sewn in linen bags, and interspersed among the shelves and drawers. These ingredients may consist of lavender, thyme, roses, cedar-shavings, powdered sassafras, cassia lignea, &c., to which a few drops of rose water, or other strong scented perfume have been added. When linen is placed by for any length of time without being used, it should be brought forth occasionally and hung up in the open air; by this means, it is prevented from becoming discolored, and the creases are prevented from wearing into holes. Mildewed linen may be restored by soaping the spots while wet, covering them with fine chalk scraped to powder, and rubbing it well in. In all cases, it will be found more consistent with economy to examine and repair linen that may stand in need of it previous to sending it to the laundry. It should be borne in mind, that too frequent washing is liable to wear out linen more than ordinary use; and therefore the process should not be repeated oftener than is absolutely necessary. It will also be found an excellent plan to have every article numbered, and so arranged after washing that each may be worn in its regular turn, and accomplish its proper term of domestic use.

Linen, To remove Stains from.—*Fruit stains* may be removed by rubbing the stain on each side with yellow soap; then tying up a piece of pearlash in it and soaking it well in hot water; the stained part should afterwards be exposed to the sun and air until removed. *Ink-stains* may be removed by wetting the part with warm water, and applying salts of lemon. *Wine stains* will disappear, if the articles stained are placed in boiling milk,

and suffered to boil until the stains disappear. Scouring drops for removing spots, grease, &c., from linen, may be compounded from an ounce each of spirits of turpentine and essence of lemon, and applied with a camel's hair brush. The essence must be recently made, or it will leave a circle round the spot.

Woollens, to Clean and Wash.—In the washing of woollens, soft water must be used; and to make the necessary lather, a pound of soap must be put into a gallon of water, and boiled until quite dissolved; the articles are then to be washed in two waters, as warm as can be borne, adding, from time to time, as much of the soap lather as may be needed. Wring the woollens out each time, then throw them into a clean tub, and cover them with boiling water. Let them remain until cool enough to admit of handling, then rinse them thoroughly, and wring them dry. It should be particularly observed, that the water used for rinsing must be hard. This method is applicable to any kinds of woollens; but for large and heavy articles, such as blankets, rugs, &c., it is preferable to omit the wringing. In all cases, the articles should be spread out perfectly straight and smooth. Another method is as follows:—Grate six or eight large raw potatoes into a pan or other deep vessel, pour on two gallons of cold spring water, and let it remain undisturbed for forty-eight hours; then pour off the water clear into a capacious pan or tub, and take care that no portion of the sediment mingles with the water. Dip the articles into this clear liquid, and pass them to and fro in such a manner that they cannot become creased. Rubbing must be wholly avoided. By this process, woollen articles will remain perfectly smooth, and need no ironing, an operation which injures the color of woollens. When thoroughly clean, hang them on a line to drip, and, when half dry, turn them, and if they require straightening, pull them out. When perfectly dry, their appearance will be improved by folding them, and placing them under heavy pressure for some hours. If the articles are greasy, but half the water should be used at first, and the remainder reserved for a second rinsing. If the colors of the articles are of a delicate nature, the potatoes used should be carefully pared previous to scraping.

Woollens, to Preserve.—When woollen articles are not in use, they may be preserved, first by drying them before a fire, then letting them cool, and afterwards mixing among them bitter apples, sewn in muslin bags, and placed between the folds of the articles.

Kid Gloves, to Clean.—Wash the hands thoroughly clean, then put on the gloves and wash them, as though you were washing your hands, in a basin containing spirits of turpentine, until quite clean; then hang the gloves up in a warm place, or where there is a free current of air, which will carry off all the smell of the turpentine. Or, make a strong lather with curd soap and warm water, in which steep a small piece of new flannel. Place the gloves on a flat, clean, and unyielding surface, such as the bottom of a dish, and having thoroughly soaped the flannel (when squeezed from the lather), rub the kid till all dirt be removed, cleaning and resoaping the flannel from time to time. Care must be taken to clean every part of the glove, by turning it in every direction. The gloves must be dried in the sun or before a moderate fire, and when quite dry they must be gradually pulled out; they will then look as well as new. *To clean colored kid gloves*, have ready on a table a clean towel folded three or four times, a saucer of new milk, and another saucer containing a piece of brown soap. Take one glove at a time, and spread it smoothly on the folded towel. Then dip in the milk a piece of flannel, rub it on the soap till it receives a tolerable quantity, and then with the soaped flannel commence rubbing the glove. Begin at the wrist and rub lengthwise towards the ends of the fingers, holding the glove firmly in your right hand. Continue this process until the glove is cleaned all over with the soap and milk. When done, spread them out, and pin them on a line to dry gradually. When nearly dry, pull them out evenly, the cross way of the leather. When quite dry, stretch them on your hands.

GLOVES, TO CLEAN.—Damp them slightly, stretch them gently over a wooden hand of appropriate size, and clean them with a sponge dipped in recently rectified oil of turpentine or camphine; as soon as they are dry, withdraw them gently from the stretcher, and suspend them in a current of air for a few days, or until they cease to smell of the turpentine. Heat must be avoided. If ordinary oil of turpentine be used a little essence of lemon may be added to it. The oil should be used liberally, and the first dirty portion should be sponged off with clean oil. *Doeskin, Buckskin, and Wash-leather gloves,* are cleaned as follows:—Stretch them on a hand, or lay them flat on a table, and rub into them a mixture of finely powdered fuller's earth and alum; sweep this off with a brush, sprinkle them with a mixture of dry bran and whiting, and lastly, dust them well off. But if the gloves are very much soiled they must be treated as follows:—Wash them in lukewarm soft water, with a little curd soap, ox-gall, or bran-tea, then stretch them on wooden hands, or pull them into shape without wringing them; next rub them with pipe-clay and yellow ochre made into a paste with ale or beer; let them dry gradually, and, when about half dry, rub them well, so as to smooth them and put them into shape; when they are dry, brush out the superfluous color, cover them with paper, and smooth them with a warm iron. *For washing gloves,* the best application is a strong lather made of curd soap with new milk; or water will do. A very small quantity of liquid will suffice. Before wetting the glove, run a strong thread through the opposite sides, close to the wrist binding. Leave it about a quarter of a yard long, and make a large knot at each end. This is to form a loop or handle by which to hang up the glove to dry, and keep it open. Having prepared the lather, put one glove on the hand, and apply the lather by means of a shaving brush or piece of fine flannel, carrying the strokes downwards—that is, from the wrist or arm to the tips of the fingers. Continue this process till the dirt disappears; then dab the glove with a clean soft towel till the soap is removed. Take off the glove, blow into it to open all the fingers, and, by means of the aforesaid loop, hang it to dry in a shady but airy place. The loop should be fixed on two pegs, or by strings fastened to a line in such a manner as to keep the sides of the glove apart while drying. When dry, they will have regained their original color and be smooth, glossy, soft, and of the proper shape.

BUCKSKIN GLOVES, TO CLEAN.—Wash them in warm water and soap until the dirt is removed, then pull them out into their proper shape, or stretch them on wooden hands. Do not wring them, but place them one on the other and press the water out. Mix a little pipe-clay, or pipe-clay and yellow ochre (according to the color required), with vinegar or beer. Rub this over the outside of the gloves and let them dry gradually in the shade or by the fire, but at some distance from it. When about half dry, rub them well and stretch them on the hand or wooden mould; after they are rubbed and dried, brush them with a soft brush, to extract the dust. Finally, iron the gloves with a smoothing iron moderately heated, taking the precaution to place a piece of cloth or paper over them; when this process is completed they will look equal to new. Tanned gloves, commonly called Limerick, are genteel and economical in spring and autumn, as they do not soil so soon as white. The tan color is made by infusing saffron in boiling water for about 12 hours, and rubbing the infusion over the leather with a brush. The water should be soft, and never applied in any case at more than blood heat.

STARCH POLISH.—White wax, 1 oz.; spermaceti, 2 oz.; melt them together with a gentle heat. When you have prepared a sufficient amount of starch, in the usual way, for a dozen pieces, put into it a piece of the polish about the size of a large pea; more or less, according to large or small washings. Or thick gum solution (made by pouring boiling water upon gum arabic), one tablespoonful to a pint of starch, gives clothes a beauful gloss.

STARCH POLISH.—Get two ounces of white gum-arabic, and pound it to

a powder; next put it into a pitcher and pour on it a pint of boiling water; then cover it and let it stand over night; in the morning pour it carefully from the dregs into a clean bottle and cork it tightly, and keep it for use.

To Make Washing Easy.—Take a half pound of hard soap cut fine and dissolved, a half pound of soda; dissolve each by itself, and when so done put them together, and boil, adding one teacupful of strained lime-water. Put this in to boil the clothes. Boil them twenty minutes. This will serve several boilers full. The clothes must be previously soaked, and soap rubbed on the stained spots. You can wash the finest material with this; and colored clothes boiled in this will not fade.

Directions for Washing Calicoes.—Calico clothes, before they are put in water, should have the grease spots rubbed out, as they cannot be seen when the whole of the garment is wet. They should never be washed in very hot soap suds; that which is mildly warm will cleanse them quite as well, and will not extract the colors so much. Soft soap should never be used for calicoes, excepting for the various shades of yellow, which look the best washed with soft soap, and not rinsed in fair water. Other colors should be rinsed in fair water, and dried in the shade. When calicoes incline to fade, the colors can be set by washing them in luke-warm water, with beef's gall, in the proportion of a teacupful to four or five gallons of water. Rinse them in fair water—no soap is necessary, without the clothes are very dirty. If so, wash them in lukewarm suds, after they have been first rubbed out in beef's gall water. The beef's gall can be kept several months, by squeezing it out of the skin in which it is enclosed, adding salt to it, and bottling and cork tight. The water that potatoes have been boiled in is an excellent thing to wash black calicoes in. When there are many black garments to wash in a family, it is a good plan to save, during the week, all the water in which potatoes are boiled. The following method is said to set the colors of calicoes so that they will not fade by subsequent washing. Infuse three gills of salt in four quarts of boiling water; put in the calicoes, (which should be perfectly clean; if not so, the dirt will be set.) Let the calicoes remain in till the water is cold. I have never seen this tried, but I think it not improbable that it may be an excellent way to set the colors, as rinsing calicoes in cold salt and water serves to set the colors, particularly of black, blue, and green colors. A little vinegar in the rinsing water of pink, red, and green calicoes, is good to brighten the colors, and keep them from mixing. All kinds of calicoes but black look better for starching, but black calicoes will not look clear if starched. On this account potato water is an excellent thing to wash them, if boiled down to a thick consistence, as it stiffens them without showing.

To Wash White Lace.—The following recipe for washing white lace is generally found more successful than any other. Cover a glass bottle with white flannel, then wind the lace around it, tack it to the flannel on both sides, and cover the whole with a piece of flannel or linen, which sew firmly round it. Then steep the bottle over night in an ewer, with soap and cold water. Next morning wash it with hot water and soap, the soap being rubbed on the outer covering. Then steep it again for some hours in cold water, and afterwards dry in the air or near the fire. Remove the outer covering and the lace is ready, no ironing being required. If the lace is very dirty, of course it must be washed a great deal.

To Make Starch.—Take a teaspoon of starch to each shirt; put it into a clean tin basin or an earthen bowl. Now prepare a little blueing water in a teacup, and pour just enough on to the dry starch to dissolve it; then pour on boiling water from the teakettle until it is well cooked, and as thin as needed for the collars; it should be thinned for the bosoms. After the hot water has been added stir in a tablespoon of gum arabic water and one-quarter teaspoon of salt into each pint of starch. The salt prevents the starch from sticking to the iron, and the gum arabic gives the polish. When the starch is nearly cool it is ready for use. Dip in the collars, or

whatever articles are to be starched, wet them thoroughly, and spat them some; roll them up tight in a dry cloth, and let them lay an hour or two. When you commence ironing, place a piece of clean muslin over that which is to be ironed until it is partially dry; then remove the cloth, and finish up with a good hot iron.

To Wash Flannels.—Soak all night in soft soap-suds. In the morning wash in the same water and rinse in two waters, using no hot water.

To Dye Black.—Allow a pound of logwood to each pound of goods that are to be dyed. Soak it over night in soft water, then boil it an hour, and strain the water in which it is boiled. For each pound of logwood, dissolve an ounce of blue vitrol in lukewarm water sufficient to wet the goods. Dip the goods in—when saturated with it, turn the whole into the logwood dye. If the goods are cotton, set the vessel on the fire, and let the goods boil ten or fifteen minutes, stirring them constantly to prevent their spotting. Silk and woollen goods should not be boiled in the dye-stuff, but it should be kept at a scalding heat for twenty minutes. Drain the goods without wringing, and hang them in a dry, shady place where they will have the air. When dry, set the color by, put them into scalding hot water that has salt in it, in the proportion of a teacupful to three gallons of the water. Let the goods remain in it till cold, then hang them where they will dry; (they should not be wrung.) Boiling hot suds is the best thing to set the color of black silk—let it remain in it till cold. Soaking black dyed goods in sour milk, is also good to set the color.

Prepare the goods by scouring well with soap and water, washing the soap well out and dipping in warm water, previous to immersion in the dye or mordant. Goods should be well aired, rinsed, and properly hung up after dyeing. Silks and fine goods should be tenderly handled, otherwise injury to the fabric will result.

In accommodation to the requirements of dyers, many of the following receipts describe dyes for large quantities of goods, but to make them equally adapted for the use of private families, they are usually given in even quantities, so that it is quite an easy matter to ascertain the quantity of materials required for dyeing, when once the weight of the goods is known; the quantity of materials used being reduced in proportion to the smaller quantity of goods.

To Fix Dyes.—*New Process.* Mr. Kipping, of Manchester, England, has a new process of fixing dyes. He dissolves 20 oz. of gelatine in water, and adds 3 oz. of bichromate of potash. This is done in a dark room. The coloring matter is then added and the goods submitted thereto; after which they are exposed to the action of light; the pigment thus becomes insoluble in water and the color is fast.

Black on Cotton.—For 40 lb. goods, use sumac 30 lbs., boil ¾ hour, let the goods steep over night, and immerse them in lime water 40 minutes, remove and allow them to drip ¾ hour, now add copperas, 4 lbs., to the sumac liquor, and dip one hour more; next work them through lime water for 20 minutes, next make a new dye of logwood 20 lbs., boil 2½ hours, and enter the goods 3 hours, then add bichromate of potash 1 lb. to the new dye, and dip 1 hour more. Work in clean cold water and dry out of the sun.

Black Dye on Wool, for Mixtures.—For 50 lbs. of wool take bichromate of potash 1 lb. 4 ozs., ground argal 15 oz., boil together, and put in the fabric, stirring well, and let it remain in the dye 5 hours; take it out, rinse slightly in clean water, then make a new dye, into which put logwood 17½ lbs. Boil 1¼ hours, adding chamber lye 5 pts. Let the fabric remain in all night, and wash out in clean water.

Chrome Black for Wool.—For 40 lbs. of goods, use blue vitriol 3 lbs., boil it a short time, then dip the wool or fabric ¾ of an hour, airing frequently; take out the goods and make a dye with logwood 24 lbs.; boil ½ hour, dip ¾ of an hour, air the goods, and dip ¼ of an hour longer, wash in strong soap suds. A good fast color.

Aniline Black on Silk or Cotton.—Water, 20 to 30 parts, chlorate of

potassa, 1 part; sal-ammoniac, 1 part; chloride of copper, 1 part; aniline 1 part; and hydrochloric, 1 part, previously mixed together. The fabric or yarn is dried in ageing rooms at a low temperature for 24 hours, and washed afterwards.

Aniline Black for Dyeing.—Water, 20 to 30 parts, chlorate of potassa, 1 part; sal-ammoniac, 1 part; chloride of copper, 1 part; aniline hydrochloric acid, of each 1 part, previously mixed together. It is essential that the preparation should be acid, and the more acid it is the more rapid will be the production of the blacks; if too much so, it may injure the fabric.

Yellow Dyes.—To dye a buff color, boil equal parts of annatto and common potash, in soft clear water. When dissolved take it from the fire; when cool, put in the goods, which should previously be washed free from spots and color; set them on a moderate fire, where they will keep hot, till the goods are of the shade you wish. To dye salmon and orange color, tie annatto in a bag, and soak it in warm soap suds, till it becomes soft, so that you can squeeze enough of it through the bag to make the suds a deep yellow—put in the articles, which should be clean and free from color; boil them till of the shade you wish. There should be enough of the dye to cover the goods—stir them while boiling, to keeping them from spotting. This dye will make the salmon and orange color, according to the strength of it, and the time the goods remain in. Drain them out of the dye and dry them quick, in the shade—when dry, wash them in soft soap suds. Goods dyed in this manner should never be rinsed in clear water. Peach leaves, fustic, and saffron, all make a good straw or lemon color, according to the strength of the dye. They should be steeped in soft fair water, in an earthen or tin vessel, and then strained, and the dye set with alum, and a little gum arabic dissolved in the dye, if you wish to stiffen the article. When the dye-stuff is strained stiffen the articles in it.

To Dye Aniline Yellow.—This color is slightly soluble in water, and for dyers' use may be used directly for the preparation of the bath dye, but is best used by dissolving 1 lb. of dye in 2 gals. alcohol. Temperature of bath should be under 200° Fah. The color is much improved and brightened by a trace of sulphuric acid.

Yellow on Silk.—For 10 lbs. goods use sugar of lead, 7½ ozs., alum, 2 lbs., enter the goods and let them remain 12 hours, remove them, drain and make a new dye with fustic 10 lbs. Immerse until the color suits.

Yellow on Cotton.—For 40 lbs. goods, use sugar of lead, 3 lbs. 8 oz., dip the goods 2 hours. Make a new dye with bi-chromate of potash, 2 lbs., dip until the color suits, wring out and dry, if not yellow enough repeat the operation.

Dyes for Furs.—*For Black*, use the hair dye described in these receipts. *Brown*, use tincture of logwood. *Red*, ground Brazil-wood, ½ lb.; water, 1½ quarts; cochineal, ½ oz.; boil the Brazil-wood in the water one hour; strain and add the cochineal; boil fifteen minutes. *Scarlet color*, boil ½ oz. saffron in ½ pint of water, and pass over the work before applying the red. *Blue*, logwood, 7 oz.; blue vitriol, 1 oz.; water, 22 oz.; boil. *Purple*, logwood, 11 oz.; alum, 6 oz.; water, 29 oz. *Green*, strong vinegar, 1½ pints; best verdigris, 2 oz. ground fine; sap green, ½ oz.; mix altogether and boil.

To Dye Furs.—Any dye that will color wool will also color furs, and an immense number of such dyes can be found under the dyers' department. In buying furs examine the density and length of the down next the skin, this can easily be done by blowing briskly against the set of the fur, if it is very close and dense it is all right, but if it opens easily and exposes much of the skin, reject it.

Lime Water for Dyers' Use.—Put stone lime, 1 lb., and strong lime water, 1½ lbs. into a pail of water; rummage well for 7 or 8 minutes, then let it rest until the lime is precipitated and the water clear; add this quantity to a tubful of clear water.

Liquid Dye Colors.—1. *Blue.* Dilute Saxon blue or sulphate of indigo with water. If required for delicate work, neutralize with chalk. 2. *Purple.*

Add a little alum to a strained decoction of logwood. 3. *Green.* Dissolve sap green in water and add a little alum. 4. *Yellow.* Dissolve annatto in a weak lye of subcarbonate of soda or potash. 5. *Golden color.* Steep French berries in hot water, strain, and add a little gum and alum. 6. *Red.* Dissolve carmine in ammonia, or in weak carbonate of potash water, or infuse powdered cochineal in water, strain, and add a little gum in water. The preceding colors, thickened with a little gum may be used as inks in writing, or as colors to tint maps, foils, artificial flowers, &c., or to paint on velvet.

To Render Aniline Colors Soluble in Water.—A solution of gelatine in acetic acid of almost the consistence of syrup is first made, and the aniline in fine powder is gradually added, stirring all the time so as to make a homogeneous paste. The mixture is then to be heated over a water bath to the temperature of boiling water and kept at that heat for some time.

To Preserve Goods and Clothing from Mildew.—Alum, 2 lbs., dissolved in 60 lbs. water; blue vitriol, 2 lbs., dissolved in 8 lbs. of water; to which is added gelatine, 1 lb., dissolved in 30 lbs. of water; acetate of lead, ½ lb. dissolved in 30 lbs. of water. The solutions are all hot, and separately mixed, with the exception of the vitriol, which is added.

New Mordant for Aniline Colors.—Immerse the goods for some hours in a bath of cold water in which chloride or acetate of zinc has been dissolved until the solution shows 2° Baumé; for the wool the mordanting bath should be at a boiling heat, and the goods should also be placed in a warm bath of tannin, 90° Fahr., for half an hour. In dyeing, a hot solution of the color must be used, to which should be added, in the case of the cotton, some chloride of zinc, and, in the case of the wool, a certain amount of tannin solution.

To Bleach Linen.—Mix common bleaching-powder, in the proportion of 1 lb. to the gallon of water; stir it occasionally for three days, let it settle, and pour it off clear. Then make a ley of 1 lb. of soda to a gallon of boiling soft water, in which soak the linen for 12 hours, and boil it half an hour; next soak it in the bleaching liquor, made as above; and lastly, wash it in the usual manner. Discolored linen or muslin may be restored by putting a portion of bleaching liquor into the tub wherein the articles are soaking.

Solitaire.—Sulphate or muriate of manganese dissolved in water with a little tartaric acid imparts this beautiful bronze tint. The stuff after being put through the solution must be turned through a weak lye or potash, and afterwards through another of chloride of lime, to brighten and fix it. *Prussiate of copper* gives a *bronze* or *yellowish brown* color to silk. The piece well mordanted with blue vitriol, may be passed through a solution of *prussiate of potash.*

Slate Colored Dye.—To make a good dark slate color, boil sugar-loaf paper with vinegar, in an iron utensil—put in alum to set the color. Tea grounds, set with copperas, makes a good slate color. To produce a light slate color, boil white maple bark in clear water, with a little alum—the bark should be boiled in a brass utensil. The dye for slate color should be strained before the goods are put into it. They should be boiled in it, and then hung where they will drain and dry.

Slate Dye on Silk.—For a small quantity, take a pan of warm water, and about a teacupful of logwood liquor, pretty strong, and a piece of pearlash the size of a nut; take gray colored goods and handle a little in this liquid, and it is finished. If too much logwood is used, the color will be too dark. A *Straw color* on silk.—Use smartweed, boil in a brass vessel, and set with alum.

Brown Dye on Cotton or Linen.—Give the pieces a mixed mordant of acetate of alumina and acetate of iron, and then dye them in a bath of madder, or madder and fustic, when the acetate of alumina predominates the dye has an *amaranth* tint. A *cinnamon* tint is obtained by first giving a mordant of alum, then a madder bath, then a bath of fustic, to which a little green copperas has been added.

Brown on Silk.—Dissolve annatto, 1 lb., pearlash, 4 lbs., in boiling water, and pass the silk through it for 2 hours, then take it out, squeeze it well and dry; next give it a mordant of alum, and pass it first through a bath of Brazil-wood, and afterwards through a bath of logwood to which a little green copperas has been added, wring it out and dry, afterwards rinse well.

Cinnamon or Brown on Cotton and Silk.—Give the goods as much color, from a solution of blue vitriol, 2 oz., to water, one gal., as it will take up in dipping 15 minutes; then run it through lime-water; this will make a beautiful sky-blue of much durability; it has now to be run through a solution of prussiate of potash, 1 oz., to water, 1 gal.

Bismarck Brown for Dyeing.—Mix together 1 lb. Bismarck, 5 gals. water, and ¾ lb. sulphuric acid. This paste dissolves easily in hot water and may be used directly for dyeing. A liquid dye may be prepared by making the bulk of the above mixture, to 2 gals. with alcohol. To dye with the above mixture, sour with sulphuric acid; add a quantity of sulphate of soda, immerse the wool, and add the color by small portions, keeping the temperature under 212° Fahr. Very interesting shades may be developed by combining the color with indigo paste or picric acid.

Aniline Brown Dye.—Dissolve 1 lb. of the brown in 2 gals. of spirit, specific gravity 8200, add a sufficient quantity to the dye bath, and immerse the fabric. Wool possesses a very strong affinity for this color and no mordant is required.

Chestnut Brown on Straw Bonnets.—For 25 hats, use ground sanders, 1½ lbs., ground curcuma, 2 lbs., powdered gall nuts or sumac, ¾ lb., rasped logwood $\frac{1}{10}$ lb. Boil all together with the hats in a large kettle (so as not to crowd) for 2 hours, then withdraw the hats, rinse, and let them remain over night in a bath of nitrate of 4° Baumé, when they are washed. A darker brown may be obtained by increasing the quantity of sanders. To give the hats the desired lustre, they are brushed with a brush of dog's (couch) grass, when dry.

A Brown Dye on Wool may be induced by a decoction of oak bark, with variety of shade according to the quantity employed. If the goods be first passed through a mordant of alum the color will be brightened.

Dark Snuff Brown on Wool.—For 50 lbs. of goods, take camwood, 10 lbs., boil for 20 minutes, then dip the goods for ¾ of an hour, then take them out, and add to the dye fustic, 25 lbs.; boil 12 minutes and dip the goods ¾ of an hour, then add blue vitriol, 10 ozs., copperas, 2 lbs. 8 ozs., dip again 40 minutes; add more copperas if the shade is required darker.

Brown on Cotton.—Catechu or terra japonica gives cotton a brown color, blue vitriol turns it on the *bronze*, green copperas *darkens* it, when applied as a mordant and the stuff boiled in the bath boiling hot. Acetate of alumina as a mordant brightens it. The French color named "*Carmelite*" is given with catechu, 1 lb., verdigris, 4 ozs., and sal-ammoniac, 5 ozs.

Brown on Wool and Silk.—Infusion or decoction of walnut peels dyes wool and silk brown color, which is brightened by alum. Horse-chestnut peels also impart a brown color; a mordant of muriate of tin turns it on the *bronze*, and sugar of lead the *reddish brown*.

Red Dyes.—Madder makes a good durable red, but not a brilliant color. To make a dye of it, allow for half a pound of it three ounces of alum, and one of cream of tartar, and six gallons of water. This proportion of ingredients will make sufficient dye for six or seven pounds of goods. Heat half of the water scalding hot, in a clean brass kettle, then put in the alum and cream of tartar, and let it dissolve. When the water boils stir the alum and tartar up in it, put in the goods, and let them boil a couple of hours; then rinse them in fair water—empty the kettle, and put in three gallons of water, and the madder; rub it fine in the water, then put in the goods, and set them where they will keep scalding hot for an hour, without boiling—stir them constantly. When they have been scalding an hour, increase the fire till they boil. Let them boil five minutes; then drain them out of the dye,

and rinse them, without wringing, in fair water, and hang them in the shade, where they will dry. To dye a fine crimson, take for each pound of goods two and a half ounces of alum, an ounce and a half of white tartar—put them in a brass kettle, with sufficient fair water to cover your goods; set it where it will boil briskly for several minutes; then put in the goods, which should be washed clean, and rinsed in fair water. When the goods have boiled half an hour, take them out, without wringing, and hang it where it will cool all over alike, without drying: empty out the alum and tartar water, put fresh water in the kettle, and for each pound of goods to be dyed, put in an ounce of cochineal, powdered fine. Set the kettle on the fire, and let the water boil fifteen or twenty minutes; then put in sufficient cold water to make it lukewarm, put in the goods, and boil them an hour and a quarter—take them out without wringing, and dry them in a shady place. The blossoms of the Balm of Gilead, steeped with fair water in a vessel, then strained, will dye silk a pretty red color. The silk should be washed clean, and free from color, then rinsed in fair water, and boiled in the strained dye, with a small piece of alum. To dye a fine delicate pink, use a carmine saucer—the directions for dyeing come with the saucers. It is too expensive a dye for bulky goods, but for faded fancy shawls and ribbons, it is quite worth the while to use it, as it gives a beautiful shade of pink.

Red Madder.—This color is mostly used for army uniforms, &c. To 100 lbs. of fabric use 20 lbs. of alum, 5 lbs. of tartar, and 5 lbs. of muriate of tin. When these are dissolved, enter the goods, and let them boil for 2 hours, then take them out, let cool, and lay over night. Into fresh water, stir 75 lbs. of good madder, and enter the fabric at 120° Fahr. and bring it up to 200° in the course of an hour, handle well to secure evenness, then rinse and dry.

Scarlet with Lac Dye.—For 100 lbs. of flannel or yarn, take 25 lbs. of ground lac dye, 15 lbs. of scarlet spirit (made as per directions below), 5 lbs. of tartar, 1 lb. of flavine, or according to shade, 1 lb. of tin crystals, 5 lbs. of muriatic acid. Boil all for 15 minutes, then cool the dye to 170° Fahr.; enter the goods, and handle them quickly at first. Let them boil 1 hour, rinse them while yet hot, before the gum and impurities harden. This color stands scouring with soap better than cochineal scarlet. To this dye, a small quantity of sulphuric acid may be used, as it dissolves the gum.

Aniline Red.—Enclose the aniline in a small muslin bag; have a kettle (tin or brass) filled with moderately hot water and rub the substance out. Then immerse the goods to be colored, and in a short time they are done. It improves the color to wring the goods out of strong soap suds before putting them in the dye. This is a permanent color on wool or silk.

Red Dye for Wool.—For 40 lbs. of goods, make a tolerably thick paste of lac dye and sulphuric acid, and allow it to stand for a day. Now take tartar, 4 lbs., tin liquor, 2 lbs. 8 ozs., and 3 lbs. of the above paste, make a hot bath with sufficient water, and enter the goods for ¾ hour, afterwards carefully rinse and dry.

Scarlet Dye with Cochineal.—For 50 lbs. of wool, yarn, or cloth, use cream of tartar, 1 lb. 9 ozs.; cochineal pulverized, 12½ ozs., muriate of tin or scarlet spirit, 8 lbs.; after boiling the dye, enter the goods, work them well for 15 minutes, then boil them 1½ hours, slowly agitating the goods while boiling, wash in clean water, and dry out of the sun.

To Dye Aniline Scarlet.—For every 40 lbs. of goods, dissolve 5 lbs. white vitriol (sulphate of zinc) at 180° Fahr., place the goods into this bath for 10 minutes, then add the color, prepared by boiling, for a few minutes, 1 lb. aniline scarlet in 3 gals. water, stirring the same continually. This solution has to be filtered before being added to the bath. The goods remain in the latter for 15 minutes, when they have become browned and must be boiled for another half hour in the same bath after the addition of sal-ammoniac. The more of this is added the deeper will be the shade.

Crimson.—For 1 lb. of silk, alum, 3 oz.; dip at hand-heat, 1 hour; take

out and drain, while making a new dye, by boiling, 10 minutes, cochineal, 3 oz.; bruised nut-galls, 2 oz.; and cream of tartar, ½ oz., in one pail of water; when a little cool, begin to dip, raising the heat to a boil, continuing to dip 1 hour, wash, and dry.

LILAC DYE ON SILK.—For 5 lbs. of silk, use archil, 7½ lbs., mix it well with the liquor; make it boil ¼ hour, dip the silk quickly, then let it cool, and wash it in river water, and a fine half violet, or lilac, more or less full, will be obtained.

PURPLE BLUE ON WOOL.—100 lbs. of wool are first dipped in the blue vat to a light shade, then boiled in a solution of 15 lbs. of alum, and 3 lbs. of half refined tartar, for 1½ hours, the wool taken out, cooled, and let stand 24 hours. Then boil in fresh water 8 lbs. of powdered cochineal for a few minutes, cool the kettle to 170° Fahr.; handle the prepared wool in this for 1 hour, when it is ready to cool, rinse, and dry. By coloring first with cochineal, as aforesaid, and finishing in the blue vat, the fast purple or dahlia, so much admired in German broadcloths, will be produced. Tin acids must not be used in this color.

MULBERRY ON SILK.—For 5 lbs. of silk use alum, 1 lb. 4 ozs., dip 50 minutes, wash out, and make a dye with Brazil-wood, 5 ozs., and logwood, 1¼ ozs. by boiling together; dip in this ½ hour, then add more Brazil-wood and logwood, equal parts, until the color suits.

DARK STEEL COLOR.—Mix black and white wool together in the proportion of 50 lbs. of black wool to 7½ lbs. of white. For large or small quantities keep the same proportion, mixing carefully and throughly.

LIGHT SILVER DRAB.—For 50 lbs. of goods use logwood, ½ lb., alum, about the same quantity; boil well, enter the goods, and dip them for 1 hour. Grade the color to any desired shade, by using equal parts of logwood and alum.

ORANGE DYE.—For 40 lbs. of goods, use sugar of lead, 2 lbs., boil 15 minutes, when a little cool, enter the goods, and dip for 2 hours, wring them out, make a fresh dye with bi-chromate of potash, 4 lbs., madder, 1 lb., immerse until of the desired color. The shade may be varied by dipping in lime water.

ORANGE DYE.—For 50 lbs. of goods, use argal, 3 lbs., muriate of tin, 1 qt., boil and dip 1 hour; then add to the dye fustic, 25 lbs.; madder, 2½ qts. and dip again 40 minutes. If preferred, cochineal, 1 lb. 4 ozs. may be used instead of the madder, as a better color is induced by it.

VIOLET DYE ON SILK OR WOOL.—A good violet dye may be given by passing the goods first through a solution of verdigris, then through a decoction of logwood, and lastly alum water. A *fast violet* may be given by dyeing the goods crimson with cochineal, without alum or tartar, and after rinsing, passing them through the indigo vat. *Linens or Cottons* are first galled with 18% of gall nuts, next passed through a mordant of alum, iron liquor, and sulphate of copper, working them well, then worked in a madder bath made with an equal weight of root, and lastly brightened with soap or soda.

ANILINE VIOLET AND PURPLE.—Acidulate the bath by sulphuric acid, or use sulphate of soda; both these substances render the shade bluish. Dye at 212° Fahr. To give a fair middle shade to 10 lbs. of wool, a quantity of solution equal to ½ to ¾ ozs. of the solid dye will be required. The color of the dyed fabric is improved by washing in soap and water, and then passing through a bath soured by sulphuric acid.

DYE FOR WOOL OR SILK.—*Color between Purple and Blue.* For 40 lbs. of goods, take bichromate of potash, 8 ozs., alum, 1 lb., dissolve all and bring the water to a boil, and put in the goods; boil 1 hour; then empty the dye, and make a new dye with logwood, 8 lbs., or extract of logwood, 1 lb. 4 ozs., and boil in this 1 hour longer. Grade the color by using more or less logwood, as you wish it dark or light in the color.

PURPLE DYE.—For 40 lbs. of goods, use alum, 3 lbs., muriate of tin, 4 teacups, pulverized cochineal, 1 lb., cream of tartar, 2 lbs. Boil the alum, tin

and cream of tartar, for 20 minutes, add the cochineal and boil 5 minutes, immerse the goods 2 hours, remove and enter them in a new dye composed of Brazil-wood, 3 lbs., logwood, 7 lbs., alum, 4 lbs., muriate of tin, 8 cupfuls, adding a little extract of indigo.

PURPLE ON COTTON.—Get up a tub of hot logwood liquor, enter 3 pieces give them 5 ends, hedge out; enter them into a clean alum tub, give them 5 ends, hedge out; get up another tub of logwood liquor, enter, give them 5 ends, hedge out; renew your alum tub, give them 5 ends in that, and finish.

PURPLE DYE FOR SILK.—For 10 lbs. of goods, enter your goods in blue dye bath, and secure a light blue color, dry and dip in a warm solution containing alum 2½ lbs. Should a deeper color be required add a little extract of indigo.

PINK DYE FOR COTTON.—For 40 lbs. of goods, use redwood, 20 lbs., muriate of tin, 2½ lbs.; boil the redwood 1 hour, turn off into a large vessel add the muriate of tin, and put in the goods, let it stand a few minutes (5 or 10), and a nice pink will be produced. It is quite a fast color.

PINK DYE FOR WOOL.—For 60 lbs. of goods, take alum, 5 lbs. 12 ozs., boil and immerse the goods 50 minutes, then add to the dye cochineal well pulverized, 1 lb. 4 ozs., cream of tartar, 5 lbs., boil and enter the goods while boiling, until the color is satisfactory.

WINE COLOR DYE.—For 50 lbs. of goods use camwood, 10 lbs., boil 20 minutes, dip the goods 1 hour, boil again, and dip 40 minutes, then darken with blue vitriol, 15 ozs., and should you wish it darker, add 5 lbs. of copperas.

SOLFERINO AND MAGENTA DYES ON WHITE WOOLLEN, SILK, OR COTTON AND WOOLLEN MIXTURES.—For 1 lb. of woollen goods, *Magenta shade*, 96 grs. apothecaries' weight of aniline red will be required; dissolve in a little warm alcohol: using say 6 fluid ozs. of alcohol, or about 6 gills alcohol per oz. of aniline. Many dyers use wood spirit because of its cheapness. For a *Solferino shade*, use 64 grs. aniline red, dissolved in 4 ozs. alcohol, to each 1 lb. of goods. Cold water, 1 qt., will dissolve these small quantities of aniline red, but the cleanest and quickest way will be found by using the alcohol, or wood spirit. Clean the cloth and goods by steeping at a gentle heat in weak soap suds, rinse in several messes of clean water and lay aside moist. The alcoholic solution of aniline is to be added from time to time to the warm or hot dye bath, till the color on the goods is of the desired shade. The goods are to be removed from the dye bath before each addition of the alcoholic solution, and the bath is to be well stirred before the goods are returned. The alcoholic solution should be first dropped into a little water and well mixed, and the mixture should then be strained into the dye bath. If the color is not dark enough after working from 20 to 30 minutes, repeat the removal of the goods from the bath, and the addition of the solution, and the re-immersion of the goods from 15 to 30 minutes more, or until suited, then remove from the bath, and rinse in several messes of clean water, and dry in the shade. Use about 4 gals. water for dye-bath for 1 lb. of goods; less water for larger quantities.

VIOLET DYE ON STRAW BONNETS.—Take alum, 4 lbs., tartaric acid, 1 lb., chloride of tin, 1 lb. Dissolve and boil, allow the hats to remain in the boiling solution 2 hours, then add as much of a decoction of logwood and carmine of indigo as is requisite to induce the desired shade, and lastly, rinse finally in water in which some alum has been dissolved.

DYE FOR FEATHERS.—*Black:* Immerse for 2 or 3 days in a bath, at first hot, of logwood, 8 parts, and copperas or acetate of iron, 1 part,—*Blue:* with the indigo vat. *Brown:* by using any of the brown dyes for silk or woollen. *Crimson:* a mordant of alum, followed by a hot bath of Brazil wood, afterwards by a weak dye of cudbear. *Pink or Rose:* with safflower or lemon juice. *Plum:* with the red dye, followed by an alkaline bath. *Red:* a mordant of alum, followed by a bath of Brazil-wood. *Yellow:* a mordant of alum, followed by a bath of turmeric or weld. *Green Dye:* Take of verdigris and verditer, of each, 1 oz.; gum water, 1 pt.; mix them well and

dip the feathers, they having been first soaked in hot water, into the said mixture. *For Purple*, use lake and indigo. *For carnation*, vermilion and and smalt. Thin gum or starch water should be used in dyeing feathers.

Another Manner of dyeing Feathers.—Feathers may be dyed of various colors, as follows :—*Blue.*—One ounce of oil of vitriol by measure, one drachm of the best indigo in powder, mix them well together, and let the mixture stand for a day or two ; when wanted, shake it well, and put a tablespoonful of it into a quart of boiling water. Stir it well, put the feathers in, and let them simmer for a few minutes ; then take them out and lay them by to dry. *Green.*—Mix the indigo liquid with turmeric, and pour boiling water over it ; let the feathers simmer in the dye until they have attained the shade desired. *Lilac.*—Put two teaspoonfuls of cudbear into a quart of boiling water ; let it simmer a few minutes before the feathers are put in. *Pink.*—Three deep pink saucers in a quart of boiling water, with a small quantity of cream of tartar. If a deep color be required, use four saucers. Let the feathers remain in the dye for several hours. *Scarlet.*—Into a quart of boiling water dissolve a teaspoonful of cream of tartar, put in a teaspoonful of prepared cochineal, and then a few drops of muriate of tin. *Yellow.*—Put a tablespoonful of the best turmeric into a quart of boiling water ; when well mixed, put in the feathers. More or less of the turmeric will give them different shades, lighter or deeper, and a very small quantity of soda will give them an orange hue.

Feathers to Clean.—Feathers may be *cleansed of their animal oil* as follows :—Take for every gallon of clean water one pound of quicklime, mix them well together, and when the undissolved lime is precipitated in fine powder, pour off the clear lime water for use. Put the feathers to be cleaned into another tub, and add to them a portion of the clear lime water sufficient to cover them about three inches when well immersed and stirred about therein. The feathers when thoroughly moistened will sink down and should remain in the lime water three or four days, after which the foul liquor should be separated from them by laying them in a sieve. The feathers should be afterwards well washed in clean water, and dried upon nets, the meshes of which may be about the fineness of cabbage nets. The feathers must be from time to time shaken on the nets, and as they become dry they will fall through the meshes, and may then be collected for use. The admission of air will be serviceable in drying. The process will be completed in three weeks, and after being thus prepared the feathers will only require to be beaten to rid them of the dust. *To clean white, brown, or fawn-colored feathers*, dissolve some fine white soap in boiling soft water, and add a small piece of pearlash. When the water is just cool enough for the hand to bear it, pass the feathers several times through it squeezing them gently with the hand. Repeat the same process with a weaker solution of soap, and then rinse the feathers in cold water beating them across the hand to expel the water ; when they are nearly dry, draw each fibre or flue over the edge of a small blunt knife, turning it around in the direction you wish the curl to take ; then if the feather is to be flat, place it between the leaves of a book to press it. *Black* feathers may be cleaned with water and some gall, proceeding as above.

To Clean Ostrich Feathers.—Cut some white curd soap in small pieces pour boiling water on them and add a little pearlash. When the soap is quite dissolved, and the mixture cool enough for the hand to bear, plunge the feathers into it, and draw them through the hand till the dirt appears squeezed out of them, pass them through a clean lather with some blue in it, then rinse them in cold water with blue to give them a good color. Beat them against the hand to shake off the water, and dry by shaking them near a fire. When perfectly dry, coil each fibre separately with a blunt knife, or ivory folder.

To Bleach Feathers.—Place the feathers from 3 to 4 hours in a tepid dilute solution of bi-chromate of potassa, to which, cautiously, some nitric acid has been added (a small quantity only). To remove a greenish hue

induced by this solution, place them in a dilute solution of sulphuric acid, in water, whereby the feathers become perfectly white and bleached.

Colors for Artificial Flowers.—The French employ *velvet, fine cambric* and *kid* for the petals, and *taffeta* for the leaves. Very recently thin plates of *bleached* whalebone have been used for some portions of the artificial flowers. *Colors and Stains. Blue.*—Indigo dissolved in oil of vitriol, and the acid partly neutralized with salt of tartar or whiting. *Green.*—A solution of distilled verdigris. *Lilac.*—Liquid archil. *Red.*—Carmine dissolved in a solution of salt of tartar, or in spirits of hartshorn. *Violet.*—Liquid archil mixed with a little salt of tartar. *Yellow.*—Tincture of turmeric. The colors are generally applied with the fingers.

Green and Blue Dye, for Silks and Woollens.—For green dye, take a pound of oil of vitriol, and turn it upon half an ounce of Spanish indigo, that has been reduced to a fine powder. Stir them well together, then add a lump of pearl ash, of the size of a pea; as soon as the fermentation ceases, bottle it; the dye will be fit for use the next day. Chemic blue is made in the same manner, only using half the quantity of vitriol. For woollen goods, the Eastern indigo will answer as well as the Spanish, and comes much lower. This dye will not answer for cotton goods, as the vitriol rots the threads. Wash the articles that are to be dyed till perfectly clean, and free from color. If you cannot extract the color by rubbing it in hot suds, boil it out; rinse it in soft water, till entirely free from soap, as the soap will ruin the dye. To dye a pale color, put to each quart of soft warm water that is to be used for the dye, ten drops of the above composition; if you wish a deep color, more will be necessary. Put in the articles without crowding, and let them remain in it till of a good color; the dye stuff should be kept warm; take the articles out without wringing, drain as much of the dye out of them as possible, then hang them to dry in a shady, airy place. They should be dyed when the weather is dry; if not dried quick, they will not look nice. When perfectly dry, wash them in lukewarm suds, to keep the vitriol from injuring the texture of the cloth. If you wish for a lively bright green, mix a little of the above composition with yellow dye.

Green Dye on Silk.—Take green ebony, boil it in water, and let it settle; take the clear liquor as hot as you can bear your hands in it and handle your goods in it until of a bright yellow; then take water and put in a little sulphate of indigo; handle your goods in this till of the shade desired. The ebony may previously be boiled in a bag to prevent it sticking to the silk.

Green Dye on Wool and Silk.—Equal quantities of yellow oak and hickory bark, make a strong yellow bath by boiling, shade to the desired tint by adding a small quantity of extract of indigo.

Green Fustic Dye.—For 50 lbs. of goods use 50 lbs. of fustic with alum 11 lbs. Soak in water until the strength is extracted, put in the goods until of a good yellow color, remove the chips, and add extract of indigo in small quantities at a time, until the color is satisfactory.

Aniline Green on Silk.—Iodine green or night green dissolves easily in warm water. For a liquid dye, 1 lb. may be dissolved in 1 gal. alcohol, and mixed with 2 gals. water, containing 1 oz. sulphuric acid.

Green on Cotton.—For 40 lbs. of goods, use fustic, 10 lbs.; blue vitriol, 10 oz.; soft soap, 2½ qts.; and logwood chips, 1 lb. 4 ozs. Soak the logwood over night in a brass vessel, put it on the fire in the morning adding the other ingredients. When quite hot it is ready for dyeing; enter the goods at once, and handle well. Different shades may be obtained by letting part of the goods remain longer in the dye.

To Dye Wool with Aniline Green.—For wool, prepare two baths, one containing the dissolved dye and a quantity of carbonate of soda or borax. In this the wool is placed, and the temperature is raised to 212 degrees Fahr. A greyish green is produced, which must be brightened, and fixed in a second bath of water 100 degrees Fahr., to which some acetic acid has been added. Cotton requires preparation by sumac.

To Dye with Alkali Blue and Nicholson's Blue.—Dissolve 1 lb. of the dye in 10 gals. boiling water, add this by small portions to the dye bath, which should be rendered alkaline by borax. The fabric should be well worked about between each addition of the color. The temperature must be kept under 212° Fahr. To develope the color, wash with water, and pass through a bath containing sulphuric acid.

Aniline Blue.—To 100 lbs. of fabric dissolve 1¼ lbs. aniline blue in 3 qts. hot alcohol; strain through a filter and add it to a bath of 130° Fahr.; also 10 lbs. glauber salts, and 5 lbs. acetic acid. Enter the goods and handle them well for 20 minutes; next heat it slowly to 200° Fahr.; then add 5 lbs. sulphuric acid, diluted with water. Let the whole boil 20 minutes longer; then rinse and dry. If the aniline be added in two or three proportions during the process of coloring, it will facilitate the evenness of the color.

Logwood and Indigo Blue Dye for Cloth.—100 lbs. of cloth, color the cloth first by one or two dips in the vat of indigo blue, and rinse it well, then boil it in a solution of 20 lbs. of alum, 2 lbs. of half-refined tartar, and 5 lbs. of mordant, for 2 hours, then take it out and cool. In fresh water boil 10 lbs. of good logwood for half an hour in a bag or otherwise; cool off to 170° Fahr. before entering; handle well over a reel, let it boil for half an hour, then take it out, cool, and rinse. This is a very firm blue.

Blue Dye for Hosiery.—100 lbs. of wool are colored with 4 lbs. Guatemala or 3 lbs. Bengal indigo, in the soda or wood vat; then boil in a kettle a few minutes, 5 lbs. of cudbear or 8 lbs. of orchil paste; add 1 lb. of soda, or better, 1 pail of urine, then cool the dye to about 170° Fahr.; and enter the wool. Handle well for about 20 minutes, then take it out, cool, rinse, and dry. It is all the same if the cudbear is put in before or after the indigo. 3 ozs. of aniline purple dissolved in alcohol, ½ pt. can be used instead of the cudbear. (Wood spirit is cheaper than alcohol, and is much used now by dyers for the purpose of dissolving aniline colors). It produces a very pretty shade, but should never be used on mixed goods which have to be bleached.

Chemic Blueing or Extract of Indigo.—Take oil of vitriol, 2 lbs., and stir into it finely pulverized indigo, 8 ozs., stirring briskly for the first ½ hour, then cover it up, and stir 4 or 5 times daily for a few days, then add a little pulverized chalk, stirring it up, and keep adding it as long as it foams; it will neutralize the acid. Keep it closely corked.

Dark Blue Dye.—*Suitable for Thibets and Lastings.*—Boil 100 lbs. of the fabric for 1½ hours in a solution of alum, 25 lbs.; tartar, 4 lbs.; mordant, 6 lbs.; extract of indigo, 6 lbs.; cool them as usual. Boil in fresh water from 8 to 10 lbs. of logwood, in a bag or otherwise, then cool the dye to 170° Fahr.; reel the fabric quickly at first, then let it boil strongly for one hour. This is a very good imitation of indigo blue.

Blue on Cotton.—For 40 lbs. of goods, use copperas, 2 lbs.; boil, and dip 20 minutes, then dip in soap suds, and return to the dye 3 or 4 times; then make a new bath with prussiate of potash, ½ lb.; oil of vitriol, 1¼ pt.; boil ½ hour, rinse out and dry.

Sky Blue on Cotton.—60 lbs. of goods, blue vitriol, 5 lbs. Boil a short time, then enter the goods, dip 3 hours, and transfer to a bath of strong lime water. A fine *brown* color will be imparted to the goods if they are then put through a solution of prussiate of potash.

Saxon Blue.—For 100 lbs. thibet or comb yarn, use alum, 20 lbs.; cream of tartar, 3 lbs.; mordant, 2 lbs.; extract of indigo, 3 lbs., or carmine, 1 lb., makes a better color. When all is dissolved cool the kettle to 180° Fahr.; enter and handle quickly at first, then let it boil ½ hour, or until even. Long boiling dims the color. Zephyr worsted yarn ought to be prepared, first by boiling it in a solution of alum and sulphuric acid, and then the indigo is added afterwards.

Clothing Renovator.—Soft water, 1 gal.; make a strong decoction of logwood by boiling the extract with the water. Strain, when cool add 2

ozs. gum arabic in powder; bottle, cork well, and set aside for use; clean the coat well from grease and dirt, and apply the above liquid with a sponge evenly. Dilute to suit the color, and hang in the shade to dry; afterwards brush the nap smooth, and it will look like new.

To Remove Stains from Broadcloth.—Take an ounce of pipe clay that has been ground fine, and mix it with twelve drops of alcohol, and the same quantity of spirits of turpentine. Whenever you wish to remove any stains from cloth, moisten a little of this mixture with alcohol, and rub it on the spots. Let it remain till dry, then rub it off with a woollen cloth, and the spots will disappear.

To Extract Paint from Cotton, Silk, and Woollen Goods.—Saturate the spot with spirits of turpentine, and let it remain several hours, then rub it between the hands. It will crumble away, without injuring either the color or texture of the article.

To Remove Black Stains on Scarlet Woollen Goods.—Mix tartaric acid with water, to give it a pleasant acid taste, then saturate the black spots with it, taking care not to have it touch the clean part of the garment. Rinse the spots immediately, in fair water. Weak pearl-ash water is good to remove stains that are produced by acids.

To Remove Grease.—Aqua ammonia, 2 ozs.; soft water, 1 quart; saltpetre, 1 teaspoonful; shaving soap in shavings, 1 oz.; mix altogether; dissolve the soap well, and any grease or dirt that cannot be removed with this preparation, nothing else need be tried for it.

To Extract Stains from White Cotton Goods and Colored Silks.—Salts of ammonia, mixed with lime, will take out the stains of wine from silk. Spirits of turpentine, alcohol, and clear ammonia, are all good to remove stains on colored silks. Spots of common or durable ink can be removed by saturating them with lemon-juice, and rubbing on salt, then putting them where the sun will shine on them hot, for several hours. As fast as it dries, put on more lemon-juice and salt. When lemon-juice cannot be obtained, citric acid is a good substitute. Iron mould may be removed in the same way. Mildew and most other stains can be removed by rubbing on soft soap and salt, and placing it where the sun will shine on it hot. Where soap and salt will not remove stains, lemon-juice and salt will generally answer. The above things will only remove stains in warm, clear weather, when the sun is hot. Sulphuric acid, diluted with water, is very effectual in removing fruit stains. Care should be taken not to have it so strong as to eat a hole in the garment, and as soon as the stain is out, it should be rinsed in pearl-ash water, and then in fair water. Colored cotton goods, that have common ink spilt on them, should be soaked in lukewarm sour milk.

To Restore Silks Discolored by Acids.—Silks that have changed color by acids, can be restored by using hartshorn. Don't be afraid of it on the silk.

To Renew Old Silks.—Unravel and put them in a tub, cover them with cold water, let them remain one hour; dip them up and down, but do not wring; hang up to drain, and iron while yet very damp, and they will look beautiful.

To Remove Mildew from Linen.—Wet the linen which contains the mildew with soft water; rub it well with white soap; then scrape some fine chalk to powder, and rub it well into the linen; lay it out on the grass, in the sunshine, watching it to keep it damp with soft water. Repeat the process the next day, and in a few hours the mildew will entirely disappear.

To Clean Furs.—For *dark* furs; warm a quantity of new bran in a pan, taking care that it does not burn, to prevent which it must be briskly stirred. When well warmed rub it thoroughly into the fur with the hand. Repeat this two or three times, then shake the fur, and give it another sharp brushing until free from dust. For *white* furs; lay them on a table, and rub well with bran made moist with warm water, rub until quite dry,

and afterwards with dry bran. The wet bran should be put on with flannel, then dry with book muslin. Light furs, in addition to the above, should be well rubbed with magnesia or a piece of book muslin, after the bran process, against the way of the fur.

Removing Spots.—For scouring drops for removing spots, grease, etc., from linen or any other substance, take of spirits of turpentine and essence of lemon, of each one ounce. The essence must be newly-made, or it will leave a circle round the spot.

To Extract Grease from Silks, Paper, Woollen Goods, and Floors.—To remove grease spots from goods and paper, grate on them, very thick, French chalk, (common chalk will answer, but is not as good as the French chalk.) Cover the spots with brown paper, and set on a moderately warm iron, and let it remain till cold. Care must be taken not to have the iron so hot as to scorch or change the color of the cloth. If the grease does not appear to be out on removing the iron, grate on more chalk, heat the iron again, and put it on. Repeat the process till the grease is entirely out. Strong pearl-ash water, mixed with sand, and rubbed on grease spots in floors, is one of the most effective things that can be used to extract the grease.

To Extract Oil Spots from Finished Goods.—Saturate the spot with benzine, then place two pieces of very soft blotting paper under and two upon it, press well with a hot iron, and the grease will be absorbed.

To Take Out Mildew.—Mix soft soap and powdered starch, half as much salt, and the juice of a lemon; put it on both sides with a brush. Let it lay on the grass for a day and a night, till the stain comes out.

To Remove Spots from Silk.—It is said that spots may be removed from silks by pouring a few drops of spirits of turpentine on the soiled parts. The spirit, on exhaling, takes off with it the oil that causes the spots; and grease may be extracted by scraping French chalk and putting on the soiled part, and then holding it near the fire or over a warm iron. The grease, by this process melts, and the French chalk absorbs it. Brush or rub off the chalk, and if the stain is not effectually removed, repeat the operation, if necessary. Ink cannot be removed from a light silk without applying chemicals that are apt to injure the texture and color of the silk.

How to Make Old Clothes Look New.—If the articles are very dirty and contain grease spots, dissolve a little strong soap in warm water, and mix with it a small quantity of ox-gall; touch over all the spots of grease, dirt, etc., and rub them well with a stiff brush until they are entirely removed, after which the garment should be rubbed all over with a brush or sponge and warm water, to which should be added more of the soap and ox-gall. After the garment has been well rubbed over with this mixture, rinse until the water passes off clean. Then hang up to dry.

To Remove Ink Stains.—Ink stains may easily be removed from cotton or linen by washing the spot that is stained in salt and water. This should be done previous to its being washed with soap, for soap sets the color.

Directions for Cleaning Silk Goods.—When silk cushions, or silk coverings to furniture, become dingy, rub dry bran on it gently, with a woollen cloth, till clean. Remove grease spots and stains as in direction No. 410. Silk garments should have the spots extracted before being washed—use hard soap for all colors but yellow, for which soft soap is the best. Put the soap into hot water, beat it till it is perfectly dissolved, then add sufficient cold water to make it just lukewarm. Put in the silks, and rub them in it till clean; take them out without wringing, and rinse them in fair lukewarm water. Rinse it in another water, and for bright yellows, crimsons, and maroons, add sulphuric acid enough to the water to give it an acid taste, before rinsing the garment in it. To restore the colors of the different shades of pink, put in the second rinsing water a little vinegar or lemon juice. For scarlet, use a solution of tin; for blues, purples, and their shades, use pearl-ash; and for olive-greens, dissolve verdigris in the

rinsing water—fawn and browns should be rinsed in pure water. Dip the silks up and down in the rinsing water; take them out of it without wringing, and dry them in the shade. Fold them up while damp; let them remain to have the dampness strike through all parts of them alike, then put them in a mangler—if you have not one, iron them on the wrong side, with an iron only just hot enough to smooth them. A little isinglass or gum arabic, dissolved in the rinsing water of gauze shawls and ribbons, is good to stiffen them. The water in which pared potatoes have been boiled, is an excellent thing to wash black silks in—it stiffens, and makes them glossy and black. Beef's gall and lukewarm water is also a nice thing to restore rusty silk, and soap-suds answer very well. They look better not to be rinsed in clear water, but they should be washed in two different waters.

To Take Stains of any Kind Out of Linen.—*Stains caused by Acids.*—Wet the part, and lay on it some salt of worm-wood. Then rub it without diluting it with more water.

Another.—Let the cloth imbibe a little water without dipping, and hold the part over a lighted match at a due distance. The spots will be removed by the sulphureous gas.

Another way.—Tie up in the stained part some pearl-ash; then scrape some soap into cold soft water to make a lather, and boil the linen till the stain disappears.

Stains of Wine, Fruit, &c., after they have been long in the Linen.—Rub the part on each side with yellow soap. Then lay on a mixture of starch in cold water very thick; rub it well in, and expose the linen to the sun and air till the stain comes out. If not removed in three or four days, rub that off, and renew the process. When dry, it may be sprinkled with a little water.

Dyes for Hats.—The ordinary bath for dyeing hats, employed by the London manufacturers, consists, for twelve dozen, of 144 lbs. of logwood; 12 lbs. of green sulphate of iron or copperas; 7½ lbs. verdigris. The log wood having been introduced into the copper, and digested for some time the copperas and verdigris are added in successive quantities, and in the above proportions, along with every successive two or three dozen of hats suspended upon the dripping machine. Each set of hats, after being exposed to the bath with occasional airings during forty minutes, is taken off the pegs, and laid out upon the ground to be more completely blackened by the peroxydizement of the iron with the atmospheric oxygen. In three or four hours, the dyeing is completed. When fully dyed, the hats are well washed in running water.

To Dye Hats.—The hats should be at first strongly galled by boiling them a long time in a decoction of galls with a little logwood, that the dye may penetrate the better into their substance; after which a proper quantity of vitriol and decoction of logwood, with a little verdigris, are added, and the hats continued in this mixture for a considerable time. They are afterwards put into a fresh liquor of logwood, galls, vitriol, and verdigris, and, when the hats are of great price, or of a hair which with difficulty takes the dye, the same process is repeated a third time. For obtaining the most perfect color, the hair or wool is dyed blue previously to its being formed into hats.

Chip or Straw Hats or Bonnets may be dyed black by boiling them three or four hours in a strong liquor of logwood, adding a little copperas occasionally. Let the bonnets remain in the liquor all night; then take out to dry in the air. If the black is not satisfactory, dye again after drying. Rub inside and out with a sponge moistened in fine oil; then block. *Red Dye.*—Boil ground Brazil-wood in a lye of potash, and boil your straw hats, &c., in it. *Blue Dye.*—Take a sufficient quantity of potash lye, 1 lb. of litmus or lacmus, ground; make a decoction and then put in the straw, and boil it.

To Color Straw Hats or Bonnets a Beautiful Slate.—First, soak

the bonnet in rather strong warm suds for 15 minutes to remove sizing or stiffening; then rinse in warm water, to get out the soap; now scald cudbear, 1 oz., in sufficient water to cover the hat or bonnet; work the bonnet in this dye, at 180° of heat, until you get a light purple, now have a bucket of cold water, blued with the extract of indigo, ½ oz., and work or stir the bonnet in this, until the tint pleases; dry, then rinse out with cold water, and dry again in the shade. If you get the purple too deep in shade the final slate will be too dark.

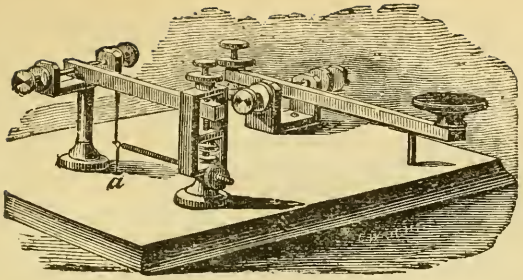
Waterproof Stiffening for Hats.—Mix 18 lbs. of shellac with 1½ lb of salt of tartar (carbonate of potash), and 5½ gals. water. These materials are to be put in a kettle, and made to boil gradually till the lac is dissolved, when the liquid will become as clear as water, without any scum on the top, and if left to cool, will have a thin crust upon the surface of a whitish cast, mixed with the light impurities of the gum. When this skin is taken off, the hat body is to be dipped into the mixture in a cold state, so as to absorb as much as possible of it; or it may be applied with a brush or sponge. The hat body, being thus stiffened, may stand till it becomes dry, or nearly so; and after it has been brushed, it must be immersed in very dilute sulphuric or acetic acid, in order to neutralize the potash, and cause the shellac to set. If the hats are not to be napped immediately, they may be thrown into a cistern of pure water, and taken out as wanted.

New Bleach for Wool, Silk, or Straw.—Mix together 4 lbs. oxalic acid, 4 lbs. table salt, water, 50 gals. The goods are laid in this mixture for one hour, they are then generally well bleached, and only require to be thoroughly rinsed and worked. For bleaching straw it is best to soak the goods in caustic soda, and afterwards to make use of chloride of lime or Javelle water. The excess of chlorine is afterwards removed by hyposulphite of soda.

Silver Grey Dye on Straw.—For 25 hats, select your *whitest* hats and soften them in a bath of crystallized soda to which some clean lime water has been added. See "*Lime water*" below. Boil for two hours in a large vessel, using for a bath a decoction of the following, viz.: alum, 4 lbs., tartaric acid, ¾ lbs., some ammoniacal cochineal, and carmine of indigo; a little sulphuric acid may be necessary in order to neutralize the alkali of the cochineal dye. If the last mentioned ingredients are used, let the hats remain for an hour longer in the boiling bath, then rinse in slightly acidulated water.

Bleaching Straw Goods.—Straw is bleached by simply exposing it in a closed chamber to the fumes of burning sulphur, an old flour barrel is the apparatus most used for the purpose by milliners, a flat stone being laid on the ground, the sulphur ignited thereon, and the barrel containing the goods to be bleached turned over it. The goods should be previously washed in pure water.

Bleaching Cotton.—It is a well established fact that cotton cloth that is bleached by chemical processes before it goes into market, does not wear as well as that which is unbleached, and is very liable in time to turn yellow; also it is very much harder to sew upon it. Sheets and pillow cases can be made up far quicker before the cotton has been wet, and allowance can be made for shrinking; indeed, any garment can be made if this item is borne in mind. Make a good suds of soft water and lye soap, if you have it; put the cotton cloth in cold suds, and bring it to a boil; then take the cloth or garment out, and when cool spread out on the snow or grass. Have a tub of suds close by so as to dip the goods in once each day. In three days they will be bleached to a snow whiteness, and keep white till worn out. This is the way our grandmothers bleached their marvellous webs of linen and damask, and it is too good a practice to be forgotten, or go out of use. When the apple trees are in bloom, spread out garments that have turned yellow, after boiling in suds, and they will be cleansed white as snow.



Mechanical Telegraph Instrument.—For Students, Colleges, &c.

TELEGRAPHY

DESIGNED FOR BEGINNERS.

INTRODUCTORY.

A Simple Description of the Morse System of Telegraphy, particularly adapted for Self Instruction in the Art.

By JESSE H. BUNNELL.

The extensive increase in the practical use of Telegraphs in connection with many branches of business has made Telegraphy almost a necessary part of a business education even for those who do not expect to practise for a livelihood this most interesting and pleasant occupation.

Many of the more prominent manufacturers now find it to be not only a great convenience, but, in fact, an absolute necessity, to have a telegraph between the business office or salesroom and the factory.

The case is the same wherever there are two or more departments of the same business located at a distance from each other and requiring frequent communication.

The Bookkeeper, Clerk or Salesman who can add to his other acquirements a knowledge of Telegraphy will frequently find this knowledge useful to his employers as well as valuable to himself.

From the simplicity and peculiarly interesting nature of the pursuit, it proves to be neither tedious nor difficult to learn—the practice being more of a pleasant pastime than a labor, while a fair degree of skill may be acquired in a very short time.

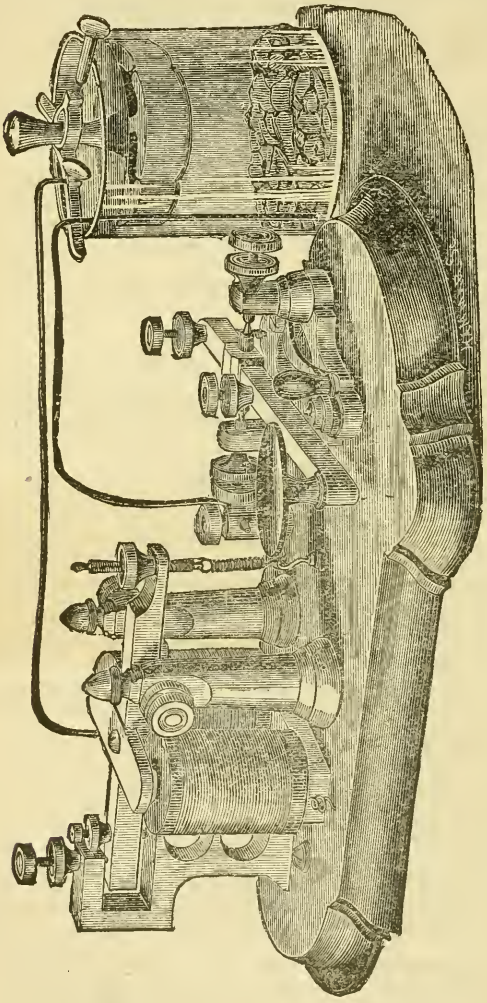
One of the best plans by which a number of persons at a time may practice and learn Telegraphy *at home* is to connect, by a wire and instruments, several different residences situated either adjacently or at a distance from each other.

In this way neighbors and friends may jointly own a wire to which there is attached an instrument in each house, placing them all in electrical communication with each other for conversation by telegraph or for practice at learning Telegraphy.

The cost of such lines is exceedingly moderate—a mile of suitable wire and thirty-five insulators costing about $27.00, while the aggregate cost of the Batteries and instruments will average about ten dollars for each instrument connected. Beyond these amounts, the labor of putting up the wire (and

erecting poles where there are neither trees nor buildings on which to fasten the wire) is the only additional expense of a complete working line.

This estimate applies as well to *all* short lines which are put up to serve purposes of convenient communication or for practice. It is the object of this work to furnish all information necessary to enable the amateur tele-



BUNNELL'S LEARNER'S INSTRUMENT, MORSE SYSTEM.

(Key, Sounder and Battery.)

CONNECTED FOR OPERATION.

grapher to build and operate a line of telegraph as well as to understand the principles upon which the Electric Telegraph is based.

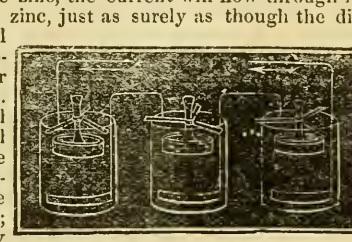
The Battery being the first essential part of the entire apparatus, the study should here begin.

It is from action created in the Battery that is first generated the electric

current, which, in practical Telegraphy, is made to traverse long or short distances through the conducting medium of metallic wires, and this current of electricity, so generated in the Battery, and so conducted through the wires, is then, by means of the proper instruments, which are herein described, made to give out tangible signals, which, being arranged in the form of an alphabet, enables us to read or speak as it were from any distance, by this means, instantaneously ; for the electric current requires but a small fraction of a second's time to travel many hundreds of miles through the wires.

With the cut of the apparatus on the preceding page is represented one cell of Gravity Battery of the kind now most generally used for telegraphic purposes throughout the United States. It consists of a glass jar, about seven inches high, nearly filled with water, immersed in which at the bottom is a cross-form plate of copper, having fastened to it an insulated conducting wire, which, passing out at the upper part of the jar, constitutes what is termed the "copper" or "positive pole" of the Battery. Around and on the copper in the bottom of the jar are placed a few ounces of sulphate of copper.

Suspended above (by means of a brass tripod, or "hanger," as it is called), is a wheel of zinc,, the body of which is allowed to remain beneath the surface of the liquid in the jar. The brass hanger is made to serve as a conductor from the zinc by means of a connecting post and screw for the attachment of a wire to one of its arms. This constitutes the negative or zinc pole of the Battery. Now, if the wire projecting upward from the copper be connected with the zinc, by attaching it at the screw-post on the hanger, a current of electricty will constantly flow from the copper to the zinc through the wire, and will cease to flow the moment the wire is disconnected. If the wire from the copper is made a mile in length, and its end connected in the same manner with the zinc, the current will flow through its entire length and come back to the zinc, just as surely as though the distance were but a few inches, and will instantaneously cease to flow the moment the wire is disconnected or broken at any point its entire length.



Where currents more powerful than can be produced by a single cell are required, additional cells are added, by connecting either the copper or zinc pole of the first cell to the opposite pole of the next, and so on ; so that in a series of fifteen or twenty cells, if the unconnected pole of the cell at one end was copper, that pole would constitute the copper pole of the entire Battery, and the unconnected zinc at the other end would be the zinc pole of the entire Battery. By connecting the end of a wire of any length to the zinc or copper pole of such a Battery, and its opposite end to the remaining pole, a much more powerful current would pass through the wire than if the Battery consisted of but one cell. Telegraph companies, on their long lines, use Batteries of from twenty to one hundred cells each. (See page 339.)

To Put the Battery in Operation.

Fill the glass jar about two-thirds full of water ; place the copper in the bottom so that it rests as nearly level as possible, and its wire passing straight upward at one side of the jar. Then drop about half a pound of sulphate of copper into the jar, so the lumps will lay evenly on the bottom or around and on the copper. Then suspend the zinc so that the body of the wheel is about two inches above the copper. As the Battery does not at once begin to act in its fullest strength when newly set up, it is well to connect the copper with the zinc and leave it so for a few hours before using. This is done by fastening the wire from the copper into the screw-post of the zinc danger, and will soon cause the Battery to work up sufficiently to be ready for use.

The Battery should be kept supplied with enough sulphate of copper so that a blue color can always be seen in the liquid at the bottom of the jar, rising to within an inch of the lower surface of the suspended zinc. If it is found that the blue color rises higher than this, it is thereby indicated too much sulphate of copper is being used, and no more should be put in until the blue has receded almost to the very bottom of the jar. The latter state of the Battery indicates that more sulphate of copper is required. Water should be from time to time added to that in the jar, to replace the loss by evaporation.

Once in two or three months it will be necessary to thoroughly clean the Battery. Take out the zinc carefully; then the copper in the same manner; pour the liquid into a separate jar, leaving behind the oxide and dirt which may have gathered in the bottom of the jar. Wash the latter out completely, and return to it the clean liquid which it had in it before; put back the copper to its place; put in a few crystals of sulphate of copper; clean the zinc thoroughly by scraping and washing, and return it also to its place. The Battery will then be in good order, and should not be disturbed excepting when necessary to clean it or add sulphate. The power of this Battery depends very much upon the position in which the zinc is placed with reference to the copper. To get the most active effect, lower the zinc to within about an inch of the copper, taking care not to allow a contact between the two. To decrease the power and render the Battery more constant or lasting, raise the zinc farther away from the copper.

Conductors and Insulation.

Mention is made in the preceding chapter of the use of wire as the means of conducting current (see page 338) of electricity from one pole of a Battery to any given point, and thence back to the opposite pole, making the "circuit," as it is called, complete. Certain substances are found to conduct electricity with more or less facility, and these substances are called conductors, while through other matter no currents whatever will pass. The latter class of substances are called non-conductors or insulation mediums.

In Telegraphy there are used as conductors, principally, copper, iron, brass, and platina. As insulation, gutta-percha, hard and soft rubber, glass, silk and cotton fibre, dry wood, bone and ivory.

Iron in the shape of wire is usually employed for outside conductors, because of its durability, cheapness, and strength, although it is not as perfect a conductor as copper, which latter is generally used for all wires inside of buildings and offices.

In conducting currents of electricity from one point to another, as in Telegraphy, it is found necessary to use non-conductors wherever a fastening of the wire is made, in order to prevent escape of the fluid at these numerous points. For this purpose, glass is principally used for outside wires, the glass "insulators" being first made fast to the pole or building, whereon the wire is to be suspended, by means of a wooden pin," (see page 339) or "bracket," after which the wire is strung, and tied to the glass with a short piece of iron "tiewire." Inside of offices, hard and soft rubber tubes are used where the wires pass through the windows, and the copper conducting wires are usually covered with a coating of gutta-percha, or wrapped with a continuous covering of cotton or silk. The latter is principally used as a covering for the wires inside the finer instruments. For the handles or knobs to the various instruments which require manipulation, hard rubber is generally used.

The Earth as a Conductor.

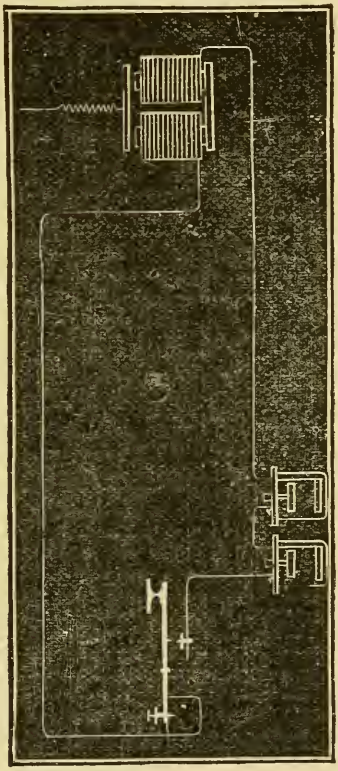
It is found that when one pole of a Battery is connected with the earth, and the wire from the opposite pole carried to a point at any distance away, and also connected with the earth, the current will flow as readily as though the "circuit" had been made complete by the use of a return wire. It is therefore shown that the earth is practically one vast conductor. This is principally due to the fact that moisture is everywhere present beneath the surface of the earth, and water itself is known to be a very fair conductor.

Telegraph companies make great practical use of earth conduction by

using it in all cases for their numerous lines, both long and short, thus saving the construction of a separate or return wire on every circuit.

MAGNETS AND KEYS. (See pages 341 and 342.)

A careful reading of the foregoing will have enabled the student to understand how currents of electricity are generated and made to travel through space. The next feature of the study will be the means which are employed to make these currents transmit signals.



The basis of the entire Telegraphic apparatus is the electro-magnet and the transmitting "key." The electro-magnet is constructed as follows: Two bars of soft iron, having round heads of rubber or wood, thus making spools of each, are fastened together by means of a short, flat bar of iron similarly soft. The round bars in the spools of the magnet are called the "cores." The flat connecting bar at the back is called the "back armature," by Telegraphers, to distinguish it from the movable piece in front, which is to be attracted to the "cores," or withdrawn by the spring, and which is called the armature.

A silk or cotton-covered wire is wound in continuous turns about the cores, until a diameter of about an inch and a half is attained, and each core or spool of the magnet contains a great number of turns of the wire

around it. Now, if a current of electricity be sent through this wire, it will, by its passing through the numerous turns, cause the iron cores within to become magnetic and to possess the power of attracting with considerable force any piece of iron brought near to their ends. The cores, being made of soft iron, will lose their magnetism and cease to exert any attractive power, the moment the current ceases to flow. The actual power of the attractive force thus exerted is directly dependent upon the power of the Battery which supplies the current, or, more properly speaking, upon the power of the current itself. Strong currents will cause the magnets to attract with a power of several pounds.

Keys are simply a contrivance for making or breaking the contacts which control the passage of the current—a brass lever, swung on a pivot, having a rubber handle which the operator grasps slightly with the thumb and fore-fingers. (See page 343.) On pressing the lever downward, a platina point projecting under the lever is brought into contact with another platina point set into an insulation of rubber in the base of the key, so that there can be no electrical connection between them unless the key is pressed down, or "closed," as it is termed. A conducting wire being separated at any point, and one of its ends connected with the lever or base of the key, and the other end with the metal set into the rubber insulation, would convey the current while the key was closed, and cease to do so the moment it was opened. Platina is used at the points where the electrical contacts are made and broken, because it does not readily fuse or tarnish. An extra lever at the side of the key is called the "circuit-breaker," and is used as a means of keeping the circuit closed when the hand of the operator is not on the key. When the circuit-breaker is pushed into its closed position, it makes contact with a brass lip, which latter is fastened to the rubber along with the lower platina point. This, then, has the same effect as though the key was pressed downward and contact made at the points.

The cut on page 317 represents a magnet with its armature suspended from a spring, and connected with it by a wire, a battery and a key. From what has now been explained, it may be seen that when the key is closed a current from the Battery will pass through the wire and magnet, and cause the latter to attract the armature, overcoming the resistance of the spring, and that the instant the key is opened the current will cease to flow, the magnet cease to attract, and the spring will instantly draw the armature back to its original position. In this way the armature is made to follow exactly the movements of the key, no matter at what distance they may be placed from each other, although in practice it is found that as the circuits are lengthened, more Battery power and more delicate instruments are required than on short lines.

The whole basis of the Telegraph system is this duplication at one point, by the magnet and its armature, of the motions made on the key by the hand of the operator, at another separate and distant point.

During the first years of Telegraphy, the Morse Register was the only means employed to put into tangible form the signals transmitted over the wires.

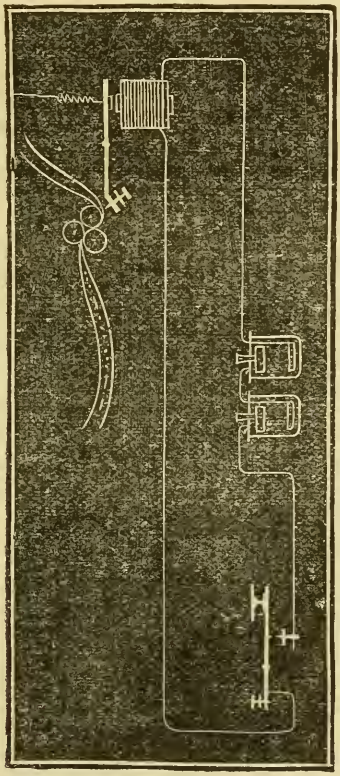
The cut on page 320 represents a working instrument of this kind, such as are now used in telegraph offices where all or a portion of the operators employed are not able to read by sound. And on page 353 will be found the code of signals already spoken of and which are known as the Morse Alphabet.

In order to give the clearest possible idea of the operation of a Register, by which it records these signals, reference is made to the next paragraph, containing an outline diagram of the main working parts of the instrument and an accompanying explanation. (See cut on page 319.)

Morse Alphabet and Register.

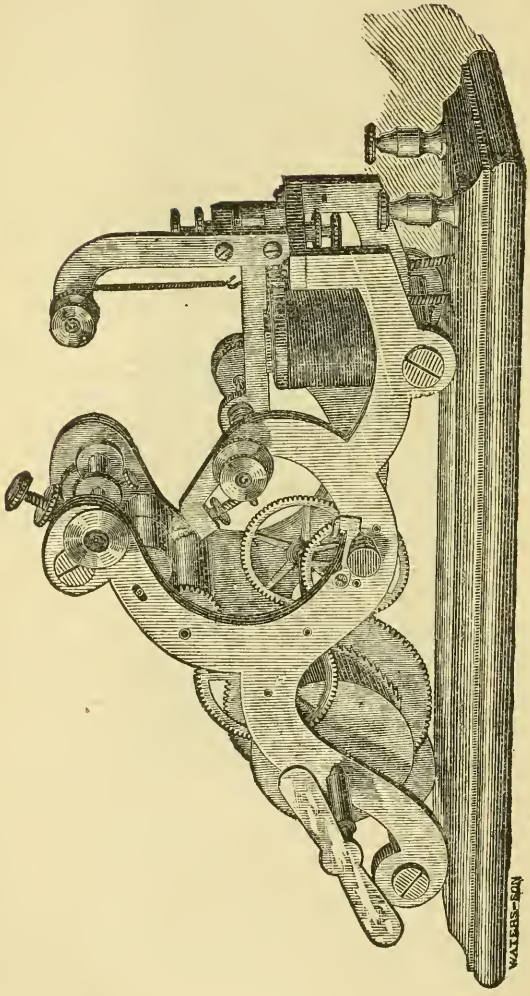
The armature of the magnet is attached to a lever, and this lever, which swings on a pivot in the middle, is provided at the end with a pointed pin or screw, which is caused to press upwards against a strip of paper whenever

the magnet attracts, and to return to its former position when the reverse is the case. Meanwhile the paper is kept moving steadily forward, so that if the lever-pin is pressed against the paper, for only an instant of time, a



short mark or *dot* appears pressed or embossed into the paper. If for a lon ger time, the mark would be proportionately longer, or a *dash*. If alternately, the marks would come consecutively, and have *spaces* between them. As the Morse Alphabet consists entirely of dots, dashes, spaces, and extra long dashes, the letters and numerals are easily made with these marks and their combinations. So that as the hand of the operator, on the key at a distant point, makes short or long strokes, dots, or dashes, or spaces, these same marks appear on the paper as it comes from the Register, and being based on the formation given by the Morse Alphabet, are as easily understood by the receiving operator as though they appeared in the well-known Roman characters.

After the Telegraph had been in successful operation for several years, the operators began to discover that, with practice, they could more easily distinguish the dots and dashes by the clicking sounds that came from the instrument, when the lever responded to the signals, than they could read them from the paper. This was the beginning of what is called READING BY SOUND. At the present time none are considered good operators who cannot read by sound, and there are comparatively few Registers in use in the United States.



TILLOTSON'S PREMIUM REGISTER.

(See page 318.)

To Set Up the Instrument for Practice.

Having set up the Battery according to directions given (see page 315) connect, as shown in the cut, one wire from the copper pole of the Battery to one of the brass binding-posts of the instrument, and one wire from the zinc pole to the remaining binding-post; screw down the instrument firmly to the table with the screw in the base, as its best sound is thereby produced. See that none of the screws are loose in their places, and that the armature lever, which is the speaking tongue of the Telegraph, plays freely, with a movement of about one-sixteenth of an inch. The spring, which draws the armature lever upwards, and is called the adjustment, should only be set at sufficient tension to raise the lever when no current is passing through the magnets. If drawn too tightly, the spring will not allow the armature to respond to the attractions of the magnet. When the instrument is not in use, leave the circuit-breaker of the key open, so that the Battery will not be in action, and its power accordingly economized. See that the platina points of the key are kept clean from dirt or dust, thus preventing imperfect contact from being made.

The key is provided with screws for the purpose of regulating its play to suit the hand of the operator, and to regulate also the pressure of the spring beneath it, for the same purpose.

A little practice will enable the student to judge best for himself as to how this should be set.

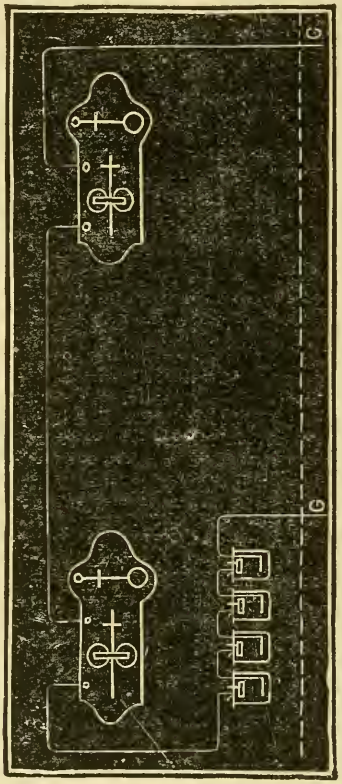
The best way to acquire the habit of correct Morse writing in the start, is by practising with another student at the same instrument, one at making letters, while the other, by listening, endeavors to name them. This is excellent practice for both; it is the beginning of sound-reading on the part of the one who names the letters, while the one who writes on the key *must* make the signals distinctly and correctly, or they cannot possibly be distinguished by the other. Start rightly, and practice will soon make perfection of skill. No mental effort whatever is required of the practical operator to construct a Morse letter the moment his eyes come to it. And in transmitting messages he transmits the right signals in a continuous stream with as little effort or thought as the accomplished penman rapidly writes the words of a manuscript. The click of an instrument is as easily understood by a "sound operator" who has had an experience of a year or two, as his own language spoken in the clearest of accents.

After two or three weeks of practice together over one instrument, two persons should be able to read each other's writing slowly, and should also have become familiar with the instruments, Battery, and the principles of their operation. Separate practice over a short line between different rooms or buildings may then with advantage begin, each student having an instrument connected at his own end of the wire, and all communication between them necessarily being made by telegraph. According to the length of line between the two instruments, two or more cells of Battery, arranged in series, as described on page 315., will be required to operate in this way. Connect instruments and Battery as follows: (See cut on page 322.)

The return circuit may be made either by a continuous wire, as indicated, or by connection with the earth at each end, *G G*. For the wires of but a short distance in length, the return wire is best; for out-door lines of more than a few hundred feet in length, use ground-wires, as earth connections are called. To make a ground wire, connect a wire to a plate or sheet of metal, zinc, iron, or tin; bury the latter in moist earth. The plate of metal should present not less than three square feet of surface. Gas and water pipes are, however, the best for this attachment, and whenever they are within reach should be used instead of buried plates in the earth.

In running an out-door wire between points at any distance apart, it should be insulated (by using glass or rubber insulators) from all direct contact with buildings, posts, or trees. (See page 338.) This prevents "escape" of the current, by which it would otherwise be diverted from its proper course through

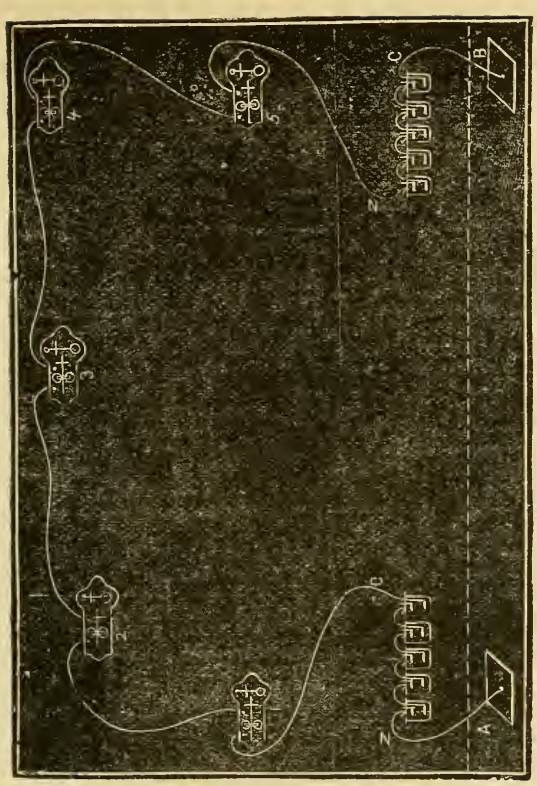
both of the instruments, and reaching the earth by a shorter route, would circulate to its opposite pole in the Battery without having any effect whatever on the distant apparatus. To make a joint or splice in wire, brighten the ends by scraping them, and twist each wire around the other as closely and firmly as possible, so that no strain will draw them apart. (See page 338.)



In running wires inside of a building, use insulated copper wire covered either with cotton or gutta-percha; fasten it in place with small staples or tacks, but in doing so be careful not to allow the covering to be opened or stripped from the wire, nor to allow the latter to come in contact with gas or water pipes, or metal posts.

In the beginning, when two persons are first practising over a short wire, arranged as described, ordinary conversation carried on by Telegraph is as good a means of practice, both at sending and at reading, as anything else. Then proceed with alternately sending printed matter from newspapers or books and copying it with a pen or pencil from the instrument by sound as the other sends it. As each improves, both in reading by sound and in sending plainly, this will become a very pleasant and interesting occupation.

It is often desired to connect three or more instruments or "offices" in the same wire, each office being in a different locality.



The above diagram illustrates the manner of connecting wires, instruments and Batteries, on such a line, Batteries being placed at each end of the wire. Battery at A has its zinc pole connected to the earth and its copper to the line; necessarily therefore the other Battery at B presents its zinc pole to the line and its copper to the earth. If both Batteries were connected with the same pole in the line, they would neutralize each other and no current whatever would be produced.

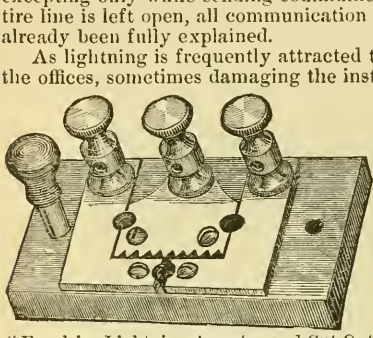
The line is connected as shown from the Battery to the first instrument and on to the next in such a way that the current is made to pass through each and every instrument on the route.

Each office should have a call or signal for itself. (See page 335.) Any one or two letters of the alphabet will suit, and serves in working over the line as the name of whatever office it is applied to. One office desiring to communicate with another, writes on the line the call of that office, three or four times, followed by his own call, and repeats this operation indefinitely, or until he is answered by the office calling. The office answering the call makes the letter "I" three or four times and signs his own call. The receipt of a communication is answered by the signal "O K," followed by the signal or call of the office receiving it. If the receiver, from any cause, fails to read or understand any portion of the communication, he calls for

a repetition by "breaking-in" and saying "G A" (go ahead from), and giving the last word understood by him. If he wishes it repeated entirely, he says "R R" (repeat).

It is necessary where two or more offices are connected together on a line, that every key should be kept closed by having its circuit-breaker shut, excepting only while sending communications. If any one key on the entire line is left open, all communication is stopped. The reason for this has already been fully explained.

As lightning is frequently attracted to out-door lines, and thereby enters the offices, sometimes damaging the instruments or even setting fire to curtains or other inflammable materal about the instrument table, a simple and cheap intrument called "lightning arrester and cut-out," is used for the purpose of intercepting and carrying to the earth such discharges of lightning as would be liable to cause damage. This apparatus is entirely effective, and is a complete safeguard against lightning.



"Excelsior Lightning Arrester and Cut Out and Ground Switch Combined.

When several persons are jointly practising on a line in which there are a number of separate instruments, placed either in different rooms or in different houses, all are thus in communication with each other, and while any one of them is writing, all the rest can simultaneously practice at reading by sound.

Main lines of Telegraph are arranged in precisely the same way. With wires of many miles in length, main Batteries, containing a large number of cells, are placed at the end stations. The return circuit is made through the earth the entire distance, and each office connected to the line in the manner here discribed. The means employed to "tap" a Telegraph line (which is sometimes done in case of railway accidents and for other purpose), are very simple, and will serve to illustrate this. The wire is simply cut, and its two ends connected to a portable instrument in the hands of a "sound-operator," who may then easily read all that passes over the wire.

Practical Directions.

The question is often asked, "How much Battery or how many cells, and what kind of Battery will work a certain length of line to which are connected a certain number of instruments?"

The Gravity Battery (see cut on page 314) described herein, is the adopted standard form in general use by most companies, and is considered to be the best for all ordinary purposes. For short lines, etc., its proper use may be practically set down according to the proportions given below; bearing in mind, however, that the greater the number of cells of Battery used, the more powerfully the instruments will work, and that if it is found when one or more instruments are properly connected in a circuit according to directions, it or they do not work with enough strength to give the amount of sound wanted, addition of more Battery will produce better results.

For one instrument, use one or two cells of Gravity Battery. For two instruments in connection, not farther than 100 feet apart, two, or three cells, adding one cell for each additional instrument connected to the same wire; also add further one cell for each quarter of a mile added to the length of the wire up to one mile, and then two or three cells for each additional mile.

For such lines, "No. 12 Galvanized iron" is the least expensive wire suitable for the purpose. For lines of between one and twelve miles in length

the instruments are required to have their magnets wound with finer wires than those used on circuits of less than one mile. Such instruments are designated as being of "20 ohms resistance." This fact should be remembered when ordering equipments for a line of over one and under twelve miles long.

Never use in the same line instruments of different resistance. Whatever other differences there may be in the instruments, they should be all alike in resistance.

For more complete description of Morse Telegraphs as they are at present operated, the student is now referred to Part II. commencing on page 338.

In Part I. will be found all the necessary rudimentary exercises and instruction which pertains to the practical acquirement of skill in Morse writing and reading, together with forms of messages, manner of communicating over a wire, abbreviations used, etc.

Although our principal design is to instruct in the art of *reading by sound*, yet those who desire to acquire the faculty of reading from paper will find the instructions equally well suited to their wants, it being impossible to give directions adapted to sound reading which are not applicable to reading by sight; indeed, every one pursuing the latter method is, in reality, governed quite as much by the clicks of the register as by the impression which it makes.

The system of instruction adopted in the first part is the result of close and long continued observation. It not only tells the student precisely *how* to proceed in the formation of nearly every character, but, in showing the right way, depends much on pointing out to him *where* and *how* he is likely to fail. Like observation has also made it clear that the Morse characters should never be placed before the student in alphabetical order. This part is intended to be practised and mastered as fast as read.

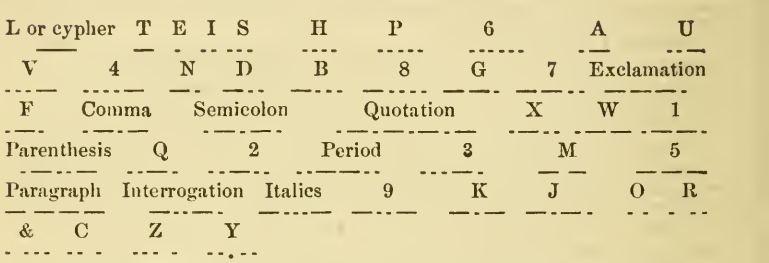
The second part, in setting forth the construction of a telegraph line, and the principles on which it is operated, although drawing to some extent on the imagination, aims to instruct synthetically, by commencing with the fundamental principles of electro-magnets, and explaining addition after addition until a full line is pictured, as well as the various obstacles arising to impede or interrupt its workings. History and theory are entirely discarded, the present condition of the telegraph and the known principles on which its working depends being all that is valuable to the student. This portion may be studied in connection with the writing exercises, and it should be reviewed a number of times.

While it is believed that the student, in following the line of instruction as herein laid before him, will progress more rapidly than by the adoption of any other mode of procedure, he is warned against falling into the too common error of expecting great results from little labor. There is no duty of a telegraphist which any person of ordinary ability may not readily learn to perform, if he will but bestow the attention which he should willingly give to any undertaking. Students with a clear understanding of the customs and principles set forth in these instructions, and able to copy each other's telegraphic writing by sound at the rate of thirty-five words per minute, may consider themselves *operators*.

PART I.

INSTRUCTIONS IN MANIPULATIONS AND BUSINESS FORMS.

MORSE CHARACTERS,



These characters, forty-five in number, are formed of three simple elementary marks; the dot, the short dash, and the long dash. These elements uncombined, are respectively E, T, and L or cipher. The remaining forty-two are made up of the dot and the short dash, the long dash never being used in combination, nor repeated except to repeat the letter or figure which it represents. The original intention was to use a longer dash for the cipher than for the letter L, but practice has made no difference in them, the long dash being invariable translated according to its connection. As an initial, or when joined with letters, it is always L; when found among figures it is necessarily a cipher.

Six of the symbols, C, O, R, Y, Z, and &, contains each a *space*, the shorter separation of the elements being denominated *breaks*. The latter are only long enough to make the elements distinct from one another: the former occupies about the room that do a dot and a break.

It is well for every operator to be familiar with all the characters in the preceding table, though some of the punctuation marks are not in general use, and on some lines hardly known. A careful examination of their formation is all that is necessary before commencing to practise them, as they can generally be committed to memory sooner than they can be made with the key.

Marks of quotation, parenthesis, or italics, are placed both before or after the word or words affected by their use.

The main points to be acquired as a basis for the whole are embraced in the following six principles, which are to be mastered before any attempt is made to form other characters.

First	principle,	Dots close together.
Second	"	Dashes close together.
Third	"	Lone dots.
Fourth	"	Lone dashes.
Fifth	"	A dot with a dash closely following.
Sixth	"	A dash closely followed by a dot.

POSITION AND MOVEMENT OF THE HAND.

Place the first two fingers on the top of the button to the key, with the thumb

partly beneath it, thus forming a gentle grasp on the button. Let the fingers resting on it be considerably bent, so that the thumb will not slip from the under side, and the wrist and arm be entirely clear of the table. The wrist must be perfectly limber, and no stiffness should be given to any part of the hand. No exertion is to be made with the thumb and fingers other than in grasping the key, and from this they should not be permitted to fly during manipulation. They borrow their force from the hand and wrist, which should move directly up and down through a distance of about three-quarters of an inch. The motion, both up and down, must be *free* and *full*, and of moderate firmness. A large majority of students write with much too little force, and they are inclined to limit the amount of movement, holding the lever down when it should rise, and keeping it up when they should press it down.

Avoid the error of pressing down with the fingers while the wrist is thrown up, and *vice versa*. The wrist, hand, fingers, and key should move in the same direction.

Remembering that the downward movement produces sounds corresponding with dots and dashes, and the upward motion the sounds representing breaks and spaces, the student may proceed with the *first principle*, making a series of dots at the rate of four or five a second, or as fast as a detached lever watch ticks. No attempt to increase this speed should be made until the whole alphabet can be readily formed when the rate can be gradually accelerated thirty or forty per cent. Fifty per cent. increase makes very rapid manipulation. Some will find it necessary to write even more moderately; and no one should manipulate more rapidly than he can do it well. The series of dots should be drilled on until the raps sound as regular as if made by clockwork.

The *second principle* may be started at the rate of one dash to a second of time, and slowly increased to three. Though uniformity in the acceleration of stroke is here desired, the important end to be obtained is a close proximity of the dashes—*breaks* and not *spaces* being wanted between them. In this exercise the rule is to hold the lever down; the exception being to allow an upward *flash* of the hand, bringing the key down again in the shortest possible time. If the upward motion be *full*, it is impossible for the most rapid operator to make his marks, whether dots or dashes, too near each other, where a regular space is not required. It must be continually borne in mind that every character not containing a *space* must be *compact*, and not open and disjointed, so as to entirely change the meaning by a division of one character into two or more shorter ones.

In commencing the *third principle* the student will be assisted by the knowledge that nearly every first attempt at making a single dot produces a short dash. A quick but firm downward flash of the key will form a good letter E. The hand should no sooner start downward than it is quickly raised, as if the first movement were a mistake. This principle holds true in every case where a *space* follows a dot.

In drilling on this, or any other character, it should not be repeated too rapidly; nor should the thumb and fingers be taken from the key during the short intervals, but through every space the thumb should pull up gently on the key; during manipulation there must always be either an upward or downward pressure exerted.

The *fourth principle*, T, L, and cipher, requires quite as much care as the letter E. An untrained hand sometimes makes T too short, but is rather inclined to the other extreme, especially when writing words; and it, almost without exception, fails to make L, or cipher, of sufficient length; indeed, both are so varied that in not a few cases students will be found making L shorter than T.

The time consumed in making the short dash is about equal to that occupied in pronouncing the word *tea*. For L, double the time must be given or about one second. It had better be made much longer than is necessary than a little too short, for in the former case it cannot be misinterpreted.

A dot with a dash closely following, or the *fifth principle*, is executed by giving the key one flash and one moderately slow closing, the hand going with a bound from the dot to the dash. The pronunciation of the word *again*, with the second syllable strongly accented, furnishes very correct time for the letter A. At the start, most every one finds himself inclined to make the dot too long and the dash too short, but more particularly to separate them too much.

The *sixth principle*, a dash closely followed by a dot, is one of the most difficult combinations. The tendency of the unpracticed to shorten the dash and lengthen the dot is so great that they are frequently reversed, forming A. This, however, can generally be remedied much sooner than they can be brought near enough together.

Measuring the time for the dash as correctly as possible, for the dot the hand must give a quick flash, as if it were trying to place the dot on top of the dash. The student must not think of taking his hand up from the dash before beginning the dot; that is, the downward position of the key is to be taken as the starting point of the dot.

A strict observance of this rule will alone prevent the occurrence of a space after the dash.

Timing by the pronunciation of the word *story*, dwelling on the first syllable rather longer than usual, and clipping the last very short, may prove to be good assistance. No more time should elapse between the dash and the dot than separates the two syllables of *story* in its pronunciation.

Justice having been done the six fundamental principles, the following exercises may be taken up in regular order, each character to be made many times before the next is practiced;

EXERCISE I.

E I S H P 6

After practising these separately until the right number of dots can be made and the last dot in each character as short as the others, run them forward and backward several times, making each one but once before proceeding to the next.

EXERCISE II.

A U V 4

In this exercise be particularly cautious to leave no space between the dots and the dash. This is the only error likely to be made. Let the dash follow the dots just as closely as if it were itself a dot.

It should be observed that this exercise is merely prolonging the last dot in I, S, H, and P.

EXERCISE III.

I A S U H V P 4

These are to be produced in couples, as represented, but no letter is to be made twice in succession. The object is to make and readily detect the difference in those in the same couple on account of their similarity.

EXERCISE IV.

N D B 8

Directions for the formation of N have already been given. It is only necessary to remember that the dots must be started from the depressed position of the hand, and that the last dot in each must be made by a movement seemingly quicker than that required for the others.

EXERCISE V.

A	Comma	F	Semicolon	Quotation
·—	·—·—·—	··—·	·—·—·—	·—·—·—·—·—

X	W	1	Parenthesis
·——··	·——	·———·	·—·——·—

Each of these, it will be seen, commences with A; and care should be taken to begin them accordingly. The comma and quotation, being nothing more than A's close together, should be made without difficulty. F is probably as difficult as any character in this exercise. A and N must be thought of at nearly the same instant. It may be commenced with the dash much too long, in order to get the dots placed near enough to it, and then the dash may be gradually shortened until it becomes of proper length.

The semicolon can be referred to A and F, or comma and E closely united. X is likely to be separated into A I, or more frequently into E D.

In forming W and 1 care must not only be taken to have them compact, but to get the dashes of equal length. The general tendency is to make the last one too short, and not in these alone, but wherever two or more dashes occur together.

There seems to be no better rule for the parenthesis than to put A and U close together.

EXERCISE VI.

U	Q	2	Period	3
··—	··—·	··—··	··———··	···—·

The warnings already given should make these characters comparatively easy, as they differ from some in Exercise V. only in starting with a dot or two more. V and E, closely joined, will form 3; and U D will make a period when properly put together.

EXERCISE VII.

M	G	7	5	Exclamation
——	——·	——··	———	———·

Paragraph ————

The breaks in these, as made by the young operator, are seldom short enough, and the last dash, as before remarked hardly long enough.

7 must not be turned into M I or M A, as is many times done.

EXERCISE VIII.

9	Interrogation	Italics	K	J
——··	——···	——·—·	—·—	—·—·

If any difficulty is experienced with 9, it should be formed from T U or D T, accordingly as the student may be oppositely inclined to divide it.

Any other guide seems unnecessary for the next two characters. J and K are generally more difficult of formation than any of the other characters, ninety-nine persons in one hundred insisting on dividing the one into double N, and the other into N T. K should always be practised before J, and by

closely following T with A, the movement for the latter being uppermost in the mind.

After the K motion is firmly fixed in the hand and mind, J may be produced by simply adding one dot, extreme caution being taken not to change the second dash into a dot and space, forming D E.

EXERCISE IX.

O R & C Z Y

. - - . - - - . - - - - . - - - . - - . - - -

These can only be referred to E, I, and S, of which they are made. The spacing should be just sufficient to easily show that they are not intended for I, S and H. The tendency is to open them too much, or make a dash of the dot immediately preceding the space.

Exercise X.

When all the characters have been correctly made, according to the preceding exercises and accompanying directions, they may then be practised in alphabetical order, but not before; for this reason they do not appear alphabetically anywhere in this book. The very common desire to begin making them in this order, and to write one's own name, even before the letters composing it have been tried separately, is altogether wrong, and should never be indulged in.

From this time onward the student should continually bear in mind that unless he is on the alert he will be making heavy dots just before spaces separating dots from dashes, but more especially dashes from dashes, and making T's too long and L's *much* too short. There are, however, certain combinations of letters in which some of these tendencies are reversed, Thus, a difficulty is found in getting the dash in 8 near the dots, and yet the same individual, in writing *th*, finds it too convenient to join them into the figure which he is inclined to separate. The same is true in regard to *an* and figure 1, *me* and G, N and *te*, D and *ti*. There is a strong inclination to join A, or a lone dot, to the last end of T and L, more particularly the latter.

Uniformity of space between letters, and between words also, is of no less importance than correct proportion of the letters themselves. The distance between two adjacent letters should be about great enough to accommodate one dot, though some operators place them still nearer. Double this space is to be left between words. A very common fault of young operators is to run their words too closely together—a fault which causes more trouble in reading than any other *one* feature of poor manipulation.

To the rule for spacing letters there are two exceptions:

Double E must contain a space nearly as great as that between words.

Double L, or two or more ciphers, need not be spaced, and they usually are not. If properly made they cannot be mistaken for anything else, as no character is formed of two or more long marks.

The words *let*, *tell*, *little*, *take*, *lake*, and *train* will furnish good exercise for overcoming some wrong and strong tendencies.

When more than three figures are used to express a whole number they should be divided into periods of three figures each, as in ordinary notation, the periods being spaced from each other the same as words. Thus 1,250,095 in telegraphic writing will be

. - - - . - - - . - - - - - - - . - - . - - - - - - - - - - -

In fractions, one dot is made to represent the line between the numerator and the denominator.

1-2 is thus expressed: . - - - . - . - - - . -

7-8 " " - - - . - . - - - . - - - .

4 3-5 " " - . - . - - - . - - - -

No sign for dollars or cents is employed, consequently these words must be written out in full. Indeed, nothing can be telegraphed which cannot be spelled. Some private marks, as those used on boxes of goods, can, in substance, by transmitted by substituting for them words expressing their shape.

A B C may be sent *diamond* A., *triangle* B., *square* C.

When the directions thus far have been thoroughly executed and the figures have become as famliar as the letters, most any short words may be taken up and written without a copy to be looked at. In learning the telegraph, the fault of going over a great deal and doing nothing well is a universal one. In writing from memory less ground is likely to be poorly run over, and one learns to send and spell at the same time, which, at first is rather difficult.

As one cannot learn to read by sound from his own writing, he always knowing what is intended to be made, two persons must practice together, taking turns at reading and writing, and each correcting the faults of the other.

At first the characters must be learned separately, then short words, chosen and written slowly and very distinctly, and well spaced. It is impossible to give much instruction that will assist in recognizing the different sounds—but there is one point to be noted—the lever makes a sound at each movement, the downward motion producing a heavier one, or that representing dots and dashes; or, more properly, the heavy stroke indicates the commencement of a dot or a dash, and the lighter sound shows when the mark ceases. E makes just as much noise as does L, the only difference being in the length of time between the heavy and the light sounds, L having no sound except at the ends. Then, if the recoil or lighter vibration be dispensed with, E, T, and L will all sound alike. Strict attention must be paid to this fact in all the letters having spaces in them, in order that they may not be confounded with the letters which they would form if the dot immediately preceding the space were changed to a dash, filling up the space.

Thus compare well the sounds of O and N, R and D, C and F, & and B Z and Q, Y and X.

Messages.

The form of regular dispatches differs but little from that of letters. Each is first dated, then addressed to some party; next comes the information to be communicated, followed by the name of the person writing it.

The terms applied to the different portions of a telegram are *date*, *address*, *body*, *signature* and *check*; and this is the order in which a dispatch is written and sent over a line.

The check is the number of words in the body of a message, and the price of transmission.

What the party sending the message says to the party addressed, or all that occurs between the address and the signature, constitutes the body; and this alone is counted and charged for, unless there are more distinct signatures than one, in which case all but the last signature is counted. Any number of names, however, constituting one firm, is to be regarded as but one signature.

Telegrams should contain as few words as possible, and at the same time clearly convey the meaning intended. The use of "Dear Sir," "Yours, &c.," is entirely unnecessary, and seldom indulged in, as they must be considered a part of the body of the message.

Notwithstanding the adoption by leading telegraph companies of certain rules for counting, there is not at the present time any uniformity in the reckoning of compound words. It was the design of these companies to have most compound words counted *one* word for the whole compound, but

the customs of operators have made the exception a better guide than the rule.

To-day, *to-night* and *to-morrow*, are each *one* word.

Except A. M. and P. M., meaning forenoon and afternoon (which are called one word each) every initial is counted a word. And F. O. B., C. O. D., signifying *free on board* and *collect on delivery*, are three words each. Custom has made two words of such numbers as twenty-six, forty-eight, seventy-two, &c., &c.

No abbreviations are permitted in the body of a message, and all numbers are first spelt out in full and afterward repeated in figures—the words and not the figures, being counted.

When desired, a company will insure the correct transmission of a dispatch for a tariff fifty per cent. higher than the usual rate, in which case it is repeated back to the operator first sending it, and he compares the repetition with the original copy.

Some lines have also doubled their rates on a certain kind of commercial dispatch, called *cipher message*. The body of these is made up of disjointed words, apparently conveying no idea, and is intended to be understood only by the party addressed.

There is but one *method* of charging for messages, ten words always being the greatest number that can be sent for the least money. Any number less than ten costs the same as ten, but each word in excess of that number is subject to a certain additional charge. The *rates* on different lines, and for different distances on the same line, vary; but the *system* of charging is precisely the same throughout this country.

If two or more copies of one dispatch are delivered to different parties, each copy must be paid for at the full rate.

Agents frequently send the same thing to five or six persons or firms.

The charges on a telegram going over any number of lines are *all* paid in advance or *all* collected on delivery. As dispatches themselves are valueless to a telegraph company, pre-payment is usually required; but when it is known that the party addressed can be found and the charges collected of him, a message is sent *collect*.

Correct Form of Ordinary Telegrams.

Buffalo, May 9th, 1865.

To Fisher & Hamilton,

New York.

Send thirty-five (35) gross, at seven three-eighths (7⅜) Funds to-morrow.

T. M. Long.

10 75 Pd.

The operator sending has to insert the abbreviations "Fr." (from) and "Sig. (signature). With "Fr." he starts to write the dispatch, and at the end of the body "Sig." is introduced, as a warning to the operator receiving, that he may place the signature in its proper position. These *abbreviations, or the words they represent, are never copied by the receiver.*

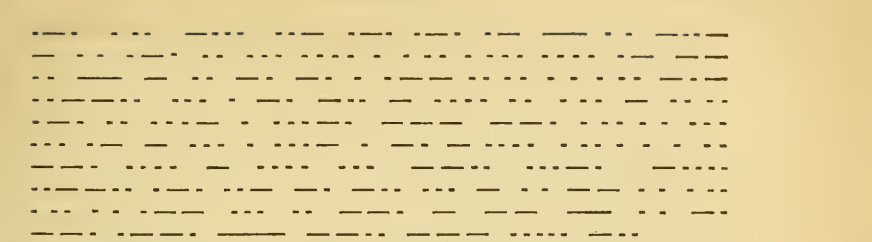
The month and year of the date are never sent over the line, and sometimes the *day* of the month is not, when it is transmitted the same day on which it is written. If written or handed into the office a day or more before sent, the correct date is telegraphed.

When the party sending, requests the hour and minute of the date to be transmitted, the request is complied with.

A period should always be used at the end of the address, and at the close of every complete sentence, except just before the signature. It is never placed after initials, and no kind of punctuation is made use of, except at the end of the address and in the body of the dispatch.

Many operators punctuate only with the period, scarcely knowing the shorter pauses.

The foregoing message should therefore be thus written on the line.



The check (Ck.) 10 75 Pd. (paid), signifies that there are ten words in the message, and that the price of transmission is 75 cents (the amount being always stated in cents), the abbreviation "Pd." showing that the dispatch is *prepaid.* "Col." accompanies some checks, indicating that the charges are to be collected of the party to whom the message is addressed.

When "Pa." is found in a check it is an order to pay out the amount following it, usually to a connecting line, but sometimes to the messenger for delivering the message some distance from the telegraph office.

There are several forms of checks having one signification, but that can be easily understood by remembering that the check of every dispatch which is *not prepaid* must contain the term *Col.;* and that the *absence* of *Col.* always determines prepayment, even if *Pd.* does not accompany the check.

In the following forms, all which appear in the same group are of like import:

Checks for Prepaid Dispatches going over but one Company's Line.

10 50 10 50 Pd 10 Pd 50
10 N Y 50 Pd

The last form, in use on some lines, is to place before the amount the "call" of the office which receives the charges whether prepaid or not, and after the amount to state if *Pd.* or *Col.* It will be seen that in this form the letters, both before and after the amount, decide the place of payment.

Checks for Dispatches going over but one line, and to be Paid on Delivery.

10 Col 50 10 50 Col 10 N Y 50 Col

Checks for Messages going over two or more Lines, and indicating Prepayment.

10 90 40 10 90 Pa 40
10 Pd 90 Pa 40 10 N Y 50 & 40 Pd

Each of these four forms means that 90 is the total charge, 50 of it belonging to the first company and 40 to the connecting line.

Checks for Dispatches going over two or more lines, Charges to be paid at the destination.

10 Col 90 Pd 40 10 N Y Col 90 Pd 40
10 N Y 50 & 40 Col

These forms show that the company delivering the message collects of the address 90, keeps 50 of it, and pays 40 to the line connecting with it.

When a dispatch goes over several lines, and is prepaid, two amounts are used in the check until it passes over the last line, when it is reduced to its simplest form—one amount: when *collect* over a number of lines, one amount is used in the first check, and two amounts in all of the rest.

The form 10 90 Pa 40 orders to be paid to the next line all that does not belong to the line sending. Thus if a message of 10 words goes over four different lines, the charge on each of which is 25, the check will be on the

First line, 10 100 Pa 75
Second " 10 75 Pa 50
Third " 10 50 Pa 25
Fourth " 10 25

In using the form 10 N Y 50 & 40 Pd, each line keeps its own rate separate in the first amount, the second being the tariff for the remainder of the route, whether one or several companies.

Thus, for four lines, each charging 25, we have :

First line, 10 A 25 & 75 Pd
Second " 10 B 25 & 50 Pd
Third " 10 C 25 & 25 Pd
Fourth " 10 D 25 Pd

The first form of check for a *collect* message going over four lines at 25 cents each, gives :

First line 10 Col 25
Second " 10 Col 50 Pd 25
Third " 10 Col 75 Pd 50
Fourth " 10 Col 100 Pd 75

The last style, under like circumstances, produces :

First line, 10 A 25 Col
Second " 10 B 25 & 25 Col
Third " 10 C 25 & 50 Col
Fourth " 10 D 25 & 75 Col

The first company sending a *collect* message receives its charges from the second company ; the second collects from the third the rate of the first added to its own ; from the fourth the third receives the charges over the first three lines, and so on, until the last company, on delivering the message, collects from the party addressed the full amount for transmission.

On a *free* message, in place of the check, is sent " D H," signifying " Dead Head," or *no charge*. Sometimes the number of words in D H messages is sent the same as in paid dispatches ; but in many instances, as on railroad lines, where it is well understood what communications should be *free*, even the D H is omitted.

Form of Cipher Dispatch, as used on Military Telegraphs, or by Speculators, to render it unintelligible to all except the party addressed.

To Brown, Henderson & Co.,
Hartford, Ct.
Aloud rampart honor deal boots bang bag cut order fox. 10 30 Pd

Form of Dispatches between Offices correcting errors, or making inquiries relating to the business of the line.

These are known as *Ofs* (office) *messages*, and are of course, D H.
To Chicago Ofs.
Can't find Hawley & Jones, 25 Fulton St., message 18th, signed Peterson. Give better address.
New York Ofs.

Reply.

To New York Ofs.
Find Hawley & Jones, 75 Fulton St. not 25. Hurry answer.
Chicago Ofs.

To understand more particularly the method of sending and receiving dispatches, it must be known that every office has a *call*, which is usually one or two of the letters occurring in the name of the place, but in a few instances a letter not to be found in the name, or a figure, is used. The calls are the signals made use of in arresting the attention of the different stations as desired ; therefore, all offices on the same line, or at least all that com-

municate direct, one with another, must have different signals. Operators must in all cases be able to distinguish their own *calls* by sound.

One office desiring to communicate with another, makes the call of that station three or four times, then gives his own office signal, and keeps repeating this until he receives a reply, or gets tired of calling.

An office answering a call makes the letter I two or three times more or less, then its own call.

An acknowledgement of the receipt of any kind of communication is made by returning O K, followed by the call of the office receiving the communication.

Writing one's own office call is termed *signing;* and this must be done *once* and *only* once, at the close of everything that is written over a line, be it calling, answering calls, giving O K, sending messages, or conversing.

Let N Y be the call for New York, and B that for Boston, and the New York operator will call the attention of the Boston operator thus:

—--- —--- —--- —- -- -- —--- —--- —--- —- -- --

Boston in reply, says: -- -- —---

When Boston calls New York, these signals merely change places.

In acknowledging the receipt of a dispatch, Boston replies with - - —-— —---, or sometimes precede the O K with the letter I a few times.

No communication is ever sent until the office to receive it has been called; and a reply has been returned; and no message is ever regarded as transmitted until the office receiving it gives O K, or commences to send back other dispatches.

Some lines number all their messages which are not D. H., each office commencing in the morning, or whenever its day's business begins)sometimes 6 P. M.), with No. 1 for each message having a destination different from others, then putting No. 2 on the next one going to the same place and so on; so that no two messages, sent to the same place, from any *one* place, in one day, will have the same number on them. If an office sends 20 messages to one station in one day the numbers will run from 1 up to 20. If dispatches go to 20 offices, one to each, all of them will bear No. 1. The loss of a communication is much less likely to occur when it is thus marked. In transmitting messages thus numbered, the number is the first thing that is sent: "Fr" comes directly after it.

When an operator discovers that he makes a telegraphic character wrong, he corrects himself by re-writing the word in which the error occurs: and if he sends a wrong word and detects his mistake, he says, "Msk" (mistake), and goes back to the word preceding.

It is the duty of every operator to count the number of words in the body of every message he receives, and if his counting does not agree with the number sent over the line, to immediately inform the sender of the fact, by stating how many words he has received. The operator sending them counts his copy also, and, if he finds that there has been a miscount of the original message, he corrects his check; but if he sees that the words are correctly counted, he begins to repeat the body of the message, and proceeds until the operator receiving discovers the error.

Sometimes the initials only are repeated. The main object of counting messages in offices receiving them is to avoid incorrect transmission.

If, while receiving anything over a line, an operator for any reason does not get it satisfactorily, he at once calls for a repetition of the unintelligible part by using some abbreviation, meaning "go ahead" or "start at," and writing the last word which he gets perfectly.

The operator receiving a dispatch should always mark on the blank, in a place provided for that purpose, the hour and minute of its reception, and the one sending must put on the face of his copy, in some convenient place, the hour and minute at which he sends it, and sometimes also the initials of

both sender and receiver, and the name or number of the wire on which it is sent. Some offices mark on one corner of original messages, the time at which they are received from the public.

ABBREVIATIONS

are used in conversation, news reports, office, and other D. H. messages, and about *paid* messages, but never in the *body* of them. The number of abbreviations in use on the various lines is quite large, but those which are used alike by all are comparatively few. Numerical abbreviations differ so greatly in their meaning on different lines, that it is deemed best not to lumber the student with information which he may have to unlearn.

The following list, including those which have one signification on all lines, will give the student such a start that he can easily learn others from their connection:

Abv.	Above.
Ads.	Address.
Ae.	Are.
Af.	After.
Ay.	Any.
Abt.	About.
Agn.	Again.
Ahr.	Another.
Amt.	Amount.
Ans.	Answer.
B.	Be.
Bf.	Before.
Bk.	Back. Book.
Bn.	Been.
Bat.	Battery.
Bbl.	Barrel.
Brk.	Break.
Dg.	Doing.
D. H.	Free.
Dn.	Done.
Ds.	Does.
Dw.	Down.
E.	Of the.
Eh.	Each.
Ehr.	Either.
Ex.	Express.
F.	Of.
Fi.	Fire.
Fr.	From.
Frt.	Freight.
Fwd.	Forward.
Fig.	Figure.
Guar.	Guaranteed.
G. A.	Go Ahead.
Gd.	Good.
Gg.	Going.
Gi.	Give.
G. M.	Good Morning.
Gn.	Gone. Good Night.
G.	Ground.
H.	Have.
Ha.	Has.
Hd.	Had.
Hf.	Half.
Btn.	Between.
Btr.	Better.
Bsns.	Business.
C.	Can.
Cc.	Commence.
Cur.	Current.
Col.	Collect.
Cd.	Could.
Ci.	Circuit.
Ck.	Check.
Cm.	Come.
Co.	Company.
Cmn.	Common.
Com.	Communication.
Condr.	Conductor.
Chgs.	Charges.
Dd.	Did.
Kw.	Know.
Lv.	Leave.
Lrn.	Learn.
Ltr.	Letter.
Ltl.	Little.
Ma.	May.
Md.	Made.
Mk.	Make.
Mkg.	Making.
Mh.	Much.
Mr.	More. Mister.
Mt.	Meet.
Mv.	Move.
Min.	Minute.
Msk.	Mistake.
Mtr.	Matter.
Msg.	Message.
Msngs.	Messenger.
Nh.	North.
N.	Not.
Na.	Name.
Ni.	Night.
Nn.	None.
No.	Number.
Nr.	Near.
Ns.	News.
Nvr.	Never.

Hm.	Him.
Ho.	Who.
Hr.	Hear. Here.
Hs.	His.
Hu.	House.
Hw.	How.
Hy.	Heavy
Htl.	Hotel.
Ik.	Like.
Immy.	Immediately.
Inst.	Instrument. Instant.
Impsb.	Impossible.
Impt.	Important
K.	Take.
Kg.	Taking.
Kn.	Taken.
Kp.	Keep.
Kps.	Compliments.
R.	For.
Rr.	Repeat. Railroad.
Rs.	Raise.
Rt.	Right.
Rhr.	Rather.
Rtn.	Return.
S.	Was.
Sa.	Same.
Sd.	Should. Said.
Sh.	Such.
Sl.	Shall.
Sm.	Some.
Sn.	Soon.
Su.	South.
Ss.	Says.
St.	Street.
Sfb.	Stop for breakfast.
Sfd.	" " dinner.
Sft.	" " tea.
Sfn.	" " the night
Sig.	Signature.
Sml.	Small.
Stk.	Stock.
Smtg.	Something.
Stix.	Sticks.
T.	The.
Tt.	That.
Td.	To-day.
Tff.	Tariff.
Tg.	Thing.
Ti.	Time.
Tk.	Think.
Nsy.	Necessary.
Ntg.	Nothing.
N. M.	No More.
O. K.	Correct.
Ovr.	Over.
Obg.	Oblige.
Ofs.	Office.
Ohr.	Other.
Op.	Operator.
Pa.	Pay.
Pc.	Place.
Pd.	Paid.
P. O.	Post Office.
Pls.	Please.
Ppr.	Paper.
Psb.	Possible.
Qk.	Quick.
Qt.	Quite.
Tnk.	Thank.
Tm.	Them. To-morrow
Tn.	Then.
Tr.	Their. There.
Ts.	This.
Ty.	They.
Tel.	Telegraph.
Tho.	Though.
Trn.	Train.
Thot.	Thought.
Thru.	Through.
U.	You.
Ur.	Your.
Ut.	But.
Un.	Under.
Und.	Understand.
V.	Very.
W.	Will.
Wa.	Way.
Wd.	Would.
Wh.	Which.
Wi.	With. Wire.
Wk.	Week. Weak.
Wl.	Well.
Wn.	When.
Wr.	Where.
Ws.	West.
Wt.	What.
Wy.	Why.
Whr.	Whether.
Wrd.	Word.
X.	Next.

Besides the foregoing, there are several large classes of words having certain terminations, which are abbreviated in a regular manner.

The termination	ing	drops in.
	ed	" e.
	ion or ian	" io or ia.
	ive	" ie.
	ial	" ia.
	ble	" e.
	ful	" u.
	ess	" es.

PART II.

PRACTICAL SCIENCE.

GENERAL PRINCIPLES OF ELECTRO-MAGNETIC TELEGRAPHS.

All telegraphs effecting communication by means of Magnets, produced by electric currents, are styled *Electro-Magnetic*; and in each are to be found five principal parts, as follows:

Conductors, for conveying the motive power—*electricity*—between spaces more or less distant.

Insulators, to confine the electric current to the conductor.

Batteries, for producing the motive power.

Magnets, with the appurtenances, to be actuated by electricity.

Manipulating keys, for controlling the current.

Conductors and Insulators.

To make lightning our obedient servant we must understand that there are certain substances through which it will readily pass, while other bodies allow it to move with great difficulty, or entirely obstruct its passage. The first-named are *conductors*, the others *non-conductors* or *insulators*. In these two general classes are found many shades of difference, so that there are all degrees of conducting power, from the best conductor to the best insulator. Metals and their alloys rank first as good conductors. Among the best of these are silver and copper, different authorities placing different ones at the head, while iron and platinum, as regards their power of conduction, are quite low in this class. The only non-metallic substance whose conductibility at all approaches that of the metals is carbon, well calcined. Other forms of this element, as charcoal and plumbago, conduct in a less degree, while the diamond, which is pure crystallized carbon, is a good insulator. Some acids, saline solutions, moist earth, animals, and green vegetables, are conductors in a still smaller degree. Pure water is yet lower in the scale, and, when frozen so as to be perfectly dry, is a non-conductor.

There is a great variety of substances having so feeble a power of conduction that they are regarded as non-conductors. Among such are chalk, lime, marble, and stone generally; rust of metals, fibrous substances, as wood, when dry, leather, parchment, feathers, papers, hair, wool, silk and cotton. Dry air, sulphur, rosin, sealing wax, gutta percha, shellac, rubber and glass, are the best of insulators. Any substance reduced to a powder becomes a conductor to a certain extent, on account of its absorption of moisture. Frictional electricity, which is vastly more intense than galvanic, can pass through glass only by making a fracture; hence, glass may be said to be an absolute non-conductor.

As oxides of metals can scarcely be considered conductors, all joints in a wire, over which an electric current is to pass, should, when formed, be perfectly clean. In making a splice in a wire, enough of the two ends to form a joint should first be brightened, and then each wire should be firmly wound around the other (Fig. 1), the different convolutions touching one

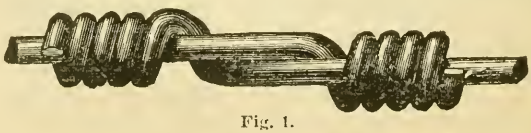


Fig. 1.

another, and passing, as near as may be, at right angles with the wire which they surround. A wire, in being spliced, must never be bent back and wound upon itself, forming a loose loop, which, for telegraphic purposes, is very unreliable.

In splicing two wires in an office, each one should be given eight or ten convolutions; but four or five will answer for the line wire, because the strain on it always keeps those joints firm. Splices in offices, however, should be avoided as much as possible.

It must be noticed that, in order to keep a current of electricity confined to a wire over which it is wished to pass, the wire must not be permitted to touch other conductors in such a manner that the current will run off on them. This is accomplished by suspending the wire on *insulators*; and when thus separated from other conducting bodies it is said to be *insulated*. Glass and vulcanized rubber are articles chiefly employed in the insulation of telegraph lines. A section of the glass insulator, and the manner in which it is attached to the pole, are exhibited in Fig. 2. B is a bracket, usually of oak, which is spiked to the pole P. Over the upper part of the bracket fits the glass G. The line wire passes by the side of the glass, to which it is fastened by a "tie" wire. The glass on the under side is concave, for the purpose of keeping that portion dry during wet weather, to prevent the current from passing from the wire to the pole.

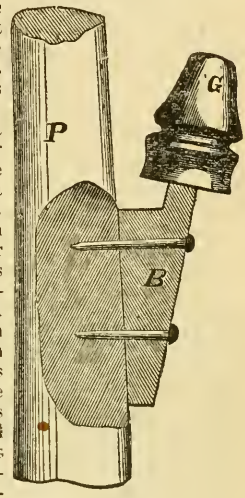


Fig. 2.

Galvanic Batteries.

In the fluid of each cup of every galvanic battery two pieces of solid conductor are placed, one end of each projecting above the fluid. These ends are termed *poles*. One of these pieces is always *zinc*; the other, some finer metal, or carbon.

A battery will generate no electricity, except while some unbroken conductor is touching *both* poles, or the poles themselves are in contact with each other. The conductor, as of wire, may be any length, and the battery will force electricity through it if the continuity be perfect, but the slightest imaginable opening in any portion of the wire will completely obstruct the passage of any electricity. The flow of electricity is known under the name of *current*: while *circuit* is the term applied to the conductor, or *path* for the current. The metals and fluids in the battery, as well as the wire, are to be considered a portion of the *circuit*.

An important principle to be continually borne in mind is, *that a current cannot be made to start from one pole of a battery unless it can pass around and touch the other pole, be the distance a few inches or a thousand miles.*

There are but three kinds of batteries in general use on telegraph lines —the Grove, the Carbon and the Daniell, or blue vitriol.* The last is the only one here considered, as it is the one generally, if not universally employed at all stations where young operators are likely to be called on to take care of a battery.

The Daniell battery is usually constructed as represented on page 341, in

* Since the above was written, the Hill and Calland Gravity Batteries have come into general use on most Telegraph Lines. In these Batteries the porous cell is dispensed with, the two solutions being separated by their respective specific gravities.

which G is a glass or glazed earthenware jar, C a cylinder of copper, open at the side and bottom, P C a porous cup and Z a cylinder or rod of zinc.

A pocket is formed on the outer and upper side of the copper, for the purpose of holding extra crystals of blue vitriol to keep up the strength of the solution. Sometimes an independent pocket, suspended on the glass jar, is used, and the copper is in some instances, formed into a perfect jar, so that the glass jar is dispensed with; but such cups are liable to become leaky.

This battery, thus put together, must stand several hours with closed circuit before it will acquire much strength. If a new battery of this kind is required to work as soon as set up, after placing the cups and cylinders in their proper position, the blue vitriol should be pulverized and put into the copper pocket, and then warm water (not hot enough to break the glass) filtered through it until the solution reaches within about two inches of the top of the jar. Then warm or hot water should be poured into the porous cup until the surfaces of the water and the blue vitriol solution are on a level with each other. The addition of six or eight drops of sulphuric acid, half a teaspoonful of white vitriol (sulphate of zinc), or of common salt, to the water in the porous cup, will cause the battery to start off with nearly full force. This battery, as generally constructed and used for local circuits, will run without any attention for ten or fifteen days, according to the length and size of the wire in the local magnet, and the number of office hours per day. If the blue vitriol solution is kept saturated, whenever the battery becomes too much weakened the zincs must be taken out and scraped, and the water in the porous cup, with the exception of a tablespoonful or two of the clear to each cup, must be thrown out and replaced with clean water. If no reservations of the old water (solution of sulphate of zinc) be made, and nothing but pure water be used, the battery, after cleaning, will be very weak for some time. The blue vitriol solution will last a year or more, or until it becomes too filthy from external causes.

It is well for every operator to understand that blue vitriol is oxide, or rust of copper, dissolved in sulphuric acid. The action of the battery separates the acid from the copper; the latter being deposited on the copper cylinder, and the former passing through the porous cup and uniting with the zinc, produces white vitriol, or sulphate of zinc. Therefore, the growth of the copper in thickness, and a corresponding diminution of the zinc, are neither mysterious nor illegitimate.

Once in two or three months the copper should be taken out and the deposit peeled off. This may be done several times, when the deposit will adhere too firmly to the original plate to be removed. Then, when so much copper accumulates as to afford too little room for the porous cup, new coppers must be brought into service.

The porous cups also became coated with copper on the outside, which, after a while, so fills up the pores as to render the cups worthless.

Neglect to keep a surplus of blue vitriol in the pocket designed for that purpose will allow the upper portion of that solution to become weak, and in consequence another current (on the principle of a battery formed of one metal and two fluids) is set up, which eats holes through the copper cylinder where the solution has become exhausted.

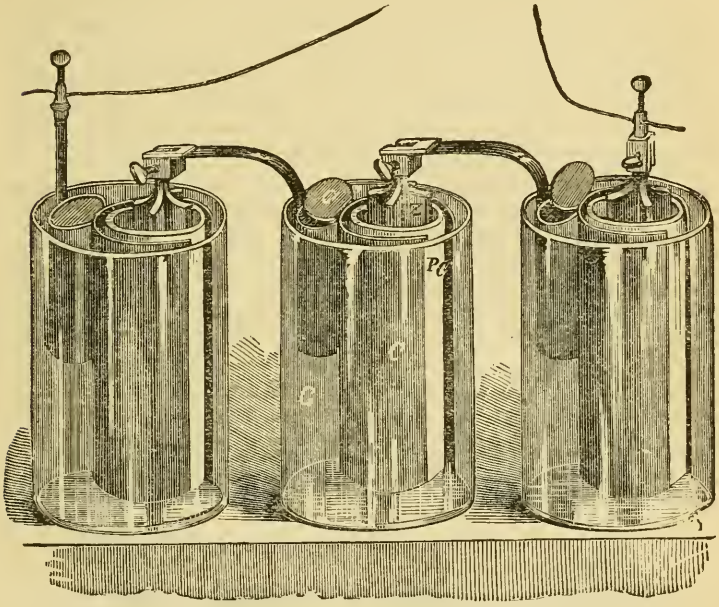
The blue vitriol solution, by the combined action of evaporation and absorption, creeps slowly up the sides of the jar, and runs over the top and down the outside. This feature of the Daniell battery may be obviated by rubbing a little oil, melted tallow, or paraffine, on the inside of the jar above the solution, or by occasionally wetting the fingers and pushing down the crystals as they appear at the top of the jar.

In this battery the copper pole is the *positive*. The zinc is the *negative* in this and every other kind of battery now in use.

In joining together any number of cups, whether of the same or of different kinds of battery, the positive pole of the first cup must be connected with the negative of the second, the positive of the second with the negative

of the third, and so on throughout the whole series. It matters not which pole we commence with, if we are only careful never to connect like poles; but this law must be as strictly observed in joining batteries hundreds of miles apart as if they stood side by side.

No battery should be permitted to freeze, for while frozen the current is very much impaired, or altogether suspended. A battery, while warm, works more vigorously, as heat is a promoter of chemical action. The connections must be kept free from rust and dirt, in order to allow the current to pass through them freely.



THE DANIELL BATTERY, THREE CELLS.

Magnets.

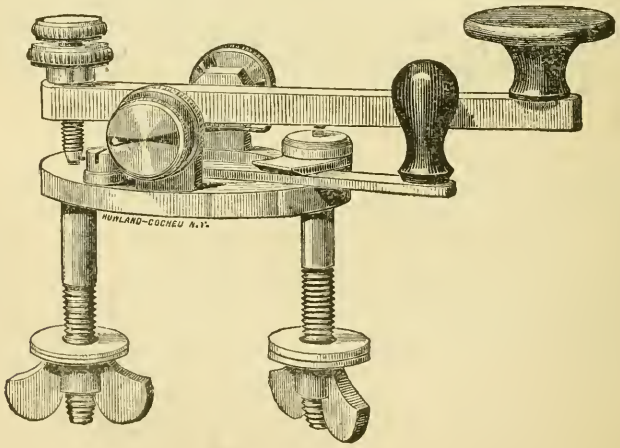
A piece of metal that will attract another at a perceptible distance, and with a force greater than that of gravitation, which is a property of all matter, is a *magnet*. The number of substances susceptible of the magnetic property may be limited to five; nickel, cobalt, iron and two of its compounds. These compounds—steel (carburet of iron) and loadstone (an iron ore)—form permanent *magnets*. Magnets of *soft iron* are altogether used for telegraphic purposes, on account of their superior magnetic power and the great rapidity with which they acquire and lose it. The softer the iron the quicker its action; and, therefore, for temporary magnets it is thoroughly annealed.

If a piece of soft iron be placed near a wire over which a current of electricity is passing, the iron, under the influence of the electric current, will be instantly magnetized, *although the two do not touch each other*, and will attract any other substance that can be similarly affected under the same influence. The moment the flow of electricity stops, the iron ceases to be a

magnet; and thus it can be magnetized and de-magnetized far more rapidly than any hand can vibrate. A bar of iron can not only become magnetic from a current not in contact with it, but can also impart this force to another piece of iron at a perceptible distance: in fact, there can be no attraction until this has taken place, when each attracts the other with the same force; hence, *magnets attract nothing but magnets, and this attraction is always mutual.* There are other means by which this peculiar property may be given to iron, but none of them have any bearing on telegraphy.

Nearly all the magnetic force of an iron bar accumulates at the ends, which are termed *poles;* and these poles, on account of a strange difference in their action, are distinguished by *north* and *south.* A north pole always *repels* a north, the same as do two souths; but north and south always *attract* each other. One end of *every* magnet has north polarity, and the other end has that of south; hence, one pole of a magnet always attracts the other. To obtain the full power of a magnet it must be bent in the middle, so that the ends come near each other, and then both poles may be brought to act on the same object. When a piece of soft iron is presented to the poles of the magnet the effect of the latter on the former is uniformly such as to set up an attraction between the two; that is, one pole cannot generate the same polarity in another piece of metal so that the two will repel each other. If, instead of bringing a rod of iron near a straight wire carrying an electric current, a long wire be completely covered with silk, or some other non-conductor, and then wound several hundred times round the iron rod, as thread is put on a spool, the magnetic effect of a given current through the wire will be vastly augmented. The object of covering the wire with silk (insulating it) is to keep the different convolutions from touching one another, so as to compel the current to follow the whole length of the conductor.

Let us take a rod of iron eight or ten inches in length, and about half an inch in diameter, and bend it into the form of the letter U; then make of some non-conducting material, as hard rubber, two spools, each about three inches long, and the ends an inch and a quarter in diameter, and well fill them with insulated copper wire. Next, slip these spools on the limbs of the bent rod, join the wire of the two spools, and we shall have an electro-magnet, very much like some in use on telegraph lines. Both spools should be wound



THE KEY.

in the same direction, and, in joining them, both inside or both outside ends of the wires, should be firmly twisted together, after the silk covering has been removed for a short distance and the ends of the wires have been brightened. If one inside should be connected with one outside end, the current through one helix would neutralize the effect of the other helix, so that no magnet would be produced. In such a case a current through either half of the wire would magnetize the iron, but not when passed through both helices.

THE KEY.

For stopping and starting the current on a wire, or, in telegraph phrase, *opening* and *closing circuit*, instead of holding the two ends of a wire in the hands, and striking them together, the key, a device for a more convenient, rapid and uniform movement, is thus arranged: A movable metallic lever, *M*, (see frontispiece, fig. 4) on an arbor, is supported by screws in the elevated sides of a metallic base, *B*. Directly beneath *M* is another piece of metal, *A*, which is separated from *B* by some non-conductor (usually vulcanized rubber). On the top and on the centre of *A* is fastened a small piece of platinum wire, and directly above, on the lever *M*, is another piece of the same metal. A screw enters the base at *D*, and serves to fasten the key firmly to the table, and, at the same time, hold one end of the wire to be operated. In the same manner another one screws into *A*, to help to bind the key to the table, and hold the other end of the wire. Now, as *A* is insulated from *B*, the current cannot pass from one to the other, except while *M* is pressed down, bringing together the two platinum points, which are, in reality, the two ends of the wire. As a light spring, under *M*, is nearly always employed, keeping the platinum points separated, whenever the hand leaves the key, a *circuit closer*, *C*, is added. This is a moveable brass arm screwed to the base, so that it can slide under a lip on *A*, thus keeping *A* and *B* electrically connected while the key is not in use. When either *M* or *C* touches *A*, the key and circuit are said to be *closed*. *Both* must be away from *A* in order to *open* or *break* circuit. The back end of *M* is furnished with a screw to regulate the amount of movement which the lever is desired to have. The finger piece of both lever and circuit closer is some non-conductor, to protect the operator from receiving an electric shock from the wire to which the key is attached.

MORSE SYSTEM OF TELEGRAPHY.

The Morse system of communication does not consist in the manner in which the line is built, nor in the kind of battery used on it, as all systems are alike in these respects; but it depends on the method of applying the current to the magnets, the appurtenances of the magnets, and the peculiar mode of causing one current to operate others.

If a magnet, such as last described, be placed in New York, at one end of the wire connected with the earth by means of some good conductor, and from the other end of the magnet wire another one of sufficient length be extended to Washington—care being taken to have it touch nothing but insulators between the two cities—and this long wire attached to one pole of a powerful galvanic battery, the other pole of which is connected with the ground by a third wire, the iron of the magnet in New York will be very sensibly affected by the battery in Washington. If we now take a piece of iron long enough to cover the poles of the magnet, and bring it near them, we will find it to be drawn toward the magnet with a very apprecable force.

We will produce an instrument like a portion of the Morse, by fastening the magnet *M*, Fig. 5, (see frontispiece) to a dry and finishing piece of board *B*, joining the second piece of iron, *A*, to a small brass bar, and supporting this bar on pivots, also fastened to the wooden base in such a position as to bring the iron near the poles of the magnet. This iron, and the brass bar to which it is attached, must be free to move toward and from the poles of the magnet. This

movable portion is known as the *armature*. The distance through which the armature moves is regulated by two brass posts running up from the base, one of them checking the motion toward the magnet, and the other limiting the reverse movement; or two adjustable screws, supported by *one* post, are most frequently employed, in which case it is necessary that the point of the screw checking the backward movement be made of some insulating body. As represented in the figure, every place to which a wire is to be attached is furnished with a binding screw. By attaching to the armature a light spiral spring, pulling in a direction from the magnet, this portion of the instrument is made ready to note electric pulsations. The attractive power of the magnet must, however, overcome the force of the spring.

Now let the wire in Washington be broken, and the magnet in New York will instantly lose its magnetic properties, and, in consequence, the spiral spring will pull the armature back. On joining the wire again in Washington the magnet is simultaneously charged, drawing the armature forward. If the opening and closing of the wire be done after the manner of telegraphic characters, the armature in New York will, at the same instant, click out the same letters, so that a sound operator will understand them with the greatest ease.

Such a line may be cut in Philadelphia, and the two ends thus made be joined to another apparatus, precisely as in New York, when both instruments will be alike operated, and at the same moment. In like manner, and with like results, other instruments may be placed in Baltimore and Washington, and at as many intermedate points as may be desired. The wire may be opened and closed at any other station as well as at Washington. The simultaneous working of all the magnets connected with the line will be effected by breaking and re-establishing the continuity of the wire at *any* point on the route; and this is, as has already been anticipated, done by means of the key.

By reference to the remarks on batteries it will be understood why the ends of the line were connected with the ground at New York and Washington. The battery was located at the latter place, and, as no current could go to New York without returning to the same battery, we either had to put up a second wire for this purpose, or allow the current to return through the earth, which proves to be better than a return wire, saying nothing of the difference in expense.

Although a battery at Washington will work a line from that place to the metropolis, a second battery at the latter city will improve the working—and a third, placed at Philadelphia, might sometimes be an advantage. Every office, however, must have a key to send messages with, and magnet with which to receive them.

Again: tracing out a line fron New York to Washington, having four offices on it, one in each of these two cities, and also in Philadelphia and Baltimore, commencing at the earth in the first named city, we find a wire running from the earth up into the office, and connecting with one pole of a galvanic battery; then from the other pole of the battery another wire, running into one of the binding screws of the key; a third wire then extending from the other binding screw of the key to one end of the wire to the magnet; and from the other end of the magnet wire a fourth wire, running out of the building at the top of the window, and passing along the route,—supported all the way on insulators fastened to poles, to keep the current from passing down to the ground—until the wire reaches Philadelphia, where it enters that office, runs through the magnet and key precisely as in New York, and again emerges from the window. The passage of the line through Baltimore and Washington is nothing but a repetition of what has taken place in the first two cities. In the last named city, the line, after joining the key, magnet, and battery, connects with the earth, joining both ends and completing the circle.

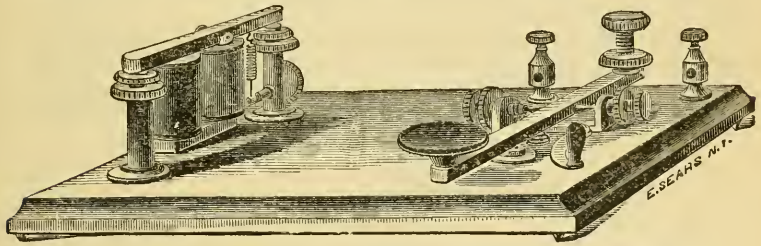
As any *one* break anywhere in the circuit completely checks all the current throughout the whole line, it follows that all keys must be shut except

the one sending a message; therefore, *two dispatches cannot be sent over one wire at the same time.*

All wire used within offices is of copper. Iron is used for the line wire, on account of its superior strength and greater cheapness.

It is not at all necessary to connect the different parts of the apparatus in the order just described. In passing a line through an office in which are a battery, key, and magnet, it matters not in the least which of them is first, second or third to be connected—the only requisite being that they may be joined one after another—for, place the key where you will in the circuit, it will do its labor of starting and stopping the entire current; the magnet situated at any point on the line, will be operated, and the battery will send its current over the whole line, if only properly connected at any place. Neither does it make any difference which way the current passes through the key or magnet. The reversal of the current through the magnet reverses the poles, but the polarity of the armature is likewise reversed, so that the working of the magnet remains unchanged.

All such questions as, "Does a message have to be forwarded at every office it is to pass?" "Which way does a dispatch go over a line?" and "What is the method of sending in different directions?" should be satisfactorily answered by the fact that, when a line is in a normal condition, *every* key in the same circuit *always* operates *every* machine situated in it, at the *same instant* and in the *same manner.*



THE EXCELSIOR TELEGRAPH INSTRUMENT—(PATENTED JUNE 24TH, 1873.)
(Battery not attached.)

MAIN AND LOCAL CIRCUITS.

A line of telegraph, as this far represented, is not a very efficient one—and it is not the Morse system *complete.* Although powerful batteries be used on such a line, the great resistance offered by so many miles of wire reduces the strength of the current to such an extent that but a weak magnet can be produced. The motion communicated to the armature of the magnet is too feeble to properly mark paper, or give as satisfactory a sound as can be obtained by the addition of other batteries and machines in a certain manner.

* It is not known whether electricity is a material substance, or merely a property of matter; and any opinion as to whether its transmission be in the form of a current by vibrations or otherwise, is sheer speculation. It is simply known that an effect travels with inconceivable rapidity, and seemingly in both directions.

Professor Faraday, in speaking of the nature of electricity before the British Association for the Advancement of Science, thus expressed his views: "There was a time when I thought I knew something about the matter, but the longer I live, and the more carefully I study the subject, the more convinced I am of my total ignorance of the nature of electricity."

When as great an electrician and profound a philosopher as the world has produced arrives at such a conclusion, the student must regard all terms seeming to indicate any form or motion of electricity as nothing more than convenient expressions.

The armature of the magnet having a motion precisely like that of the key, is converted into one, and used to operate another magnet, Fig. 6, (see frontispiece) supplied with a current from another battery, Fig. 3. To accomplish this, a battery, Fig 3, is stationed in the office, usually quite near the instrument, and from one pole of it a wire, *n*, is run to the bottom of the armature of the magnet already described, Fig. 5; and from the brass post, which checks the armature in its motion toward the magnet, a second wire, *o*, is connected with another magnet, Fig. 6, and this magnet is, with a third wire, *d*, joined to the other pole of the battery from which the first wire was started. Thus a new and very short circuit is formed of the extra battery, the extra magnet, and the armature of the first magnet. This short, side, or independent circuit, represented by dotted lines, is wholly confined to the office, and is called the *local circuit*. Fig. 6 is a *sounder*, or, in case a *register* is used, it simply takes the place of a sounder, and is connected in the same manner. *Main circuit* is the name given to the one shown in the black lines. The main circuit is the line itself, of which the earth forms one-half. The batteries have the same name as the circuits to which they are attached. The map exhibits no main battery, and does not represent the different parts located *precisely* as they are to be found in an office, but it shows their exact relations, or how they are connected. The local battery is generally placed under the table on which the instruments rest, and only enough of the ends of the wire for connecting the different parts are allowed to come up through the table.*

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* For the benefit of such as may desire to construct private Telegraph Lines for business or amusement, the following paragraphs from *Pope's Modern Practice of the Electric Telegraph* are given.

"ARRANGEMENT OF A TERMINAL STATION.—FIG. 17 is a diagram showing the arrangement of wires, batteries, and instruments for one of the terminal stations of a line.

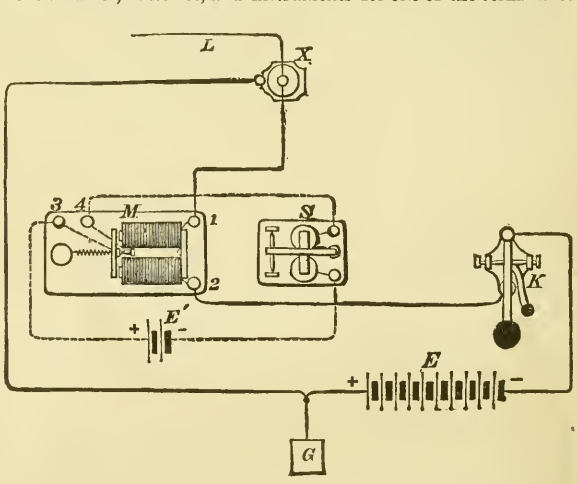


FIG. 17.

FIG. 17.

The line wire L, first enters the lightning arrester X, and passes thence through the coils of the relay M, by the binding screws 1, 2, and thence to the key K, main battery E, and finally to the ground at G. The local circuit commences at the x pole of the local battery E, and through the platinum points of the relay by the binding screws, 3, 4, thence through the register or sounder coils, S, and back to the other pole of the battery.

It must be distinctly understood that the main and the local currents *never* touch each other, and that the *local* exerts no influence whatever on the *main*. The only substances which are in contact with the two circuits are the air and the wooden base *B*, Fig. 5, (see frontispiece) and both of these are *non-conductors*. The armature *A*, Fig. 5, closes the local circuit by striking the

ARRANGEMENTS OF A WAY STATION.—FIG. 18 shows a plan of the Instruments and connections at a way station.

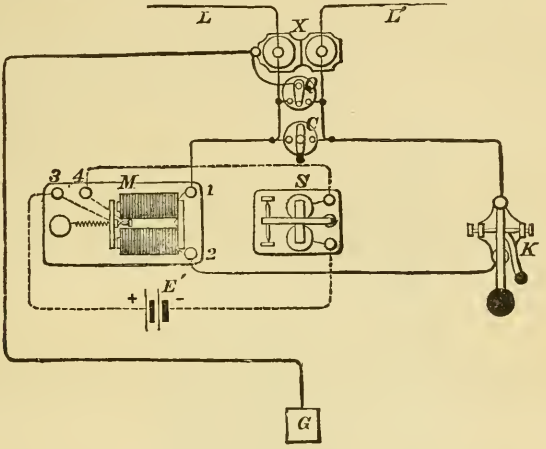


FIG. 18.

FIG. 18.

The line enters at L, passes through the lightning arrester, X, and thence through the relay M, to key K, and back to the lightning arrester, and thence to the next station by the line L. The arrangement of the local circuit is the same as in the last figure. The button C, arranged as shown in the figure, is called a "*Cut Out*." When turned so as to connect the two wires leading into the office, it allows the line current to pass across from one to the other without going through the instruments. The instruments should always be cut out, by means of this apparatus, when leaving the office tempo-

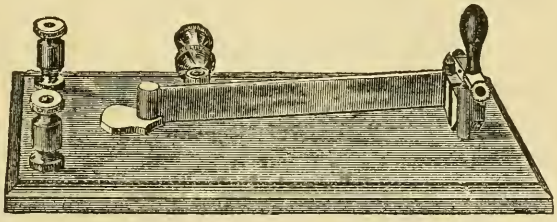


FIG. 21.

rarily or for the night, and also during a thunder storm, to avoid damage to the apparatus. FIG. 21 shows a better arrangement. The ground switch Q is used to connect the line with the earth on either side of the instruments at pleasure. It is only used in case of accidents or interruptions on the lines."

screw above the magnet. That these two points may be kept bright and make a good connection, they are made of platinum, the same as those of the key, but the tip of the other screw is of some non-conductor, so that the current cannot pass over it when the armature is drawn back by the spring. This armature is simply the key that operates the local circuit, and it may be moved back and forth by the finger, without in the least affecting the line. Fig. 5 represents the portion of the Morse apparatus known as the *receiving magnet*, because it is the first thing affected by the electric pulsations on the line. *Relay* is the name by which it is known among operators generally. By the map it is seen that every key and relay magnet is situated in the main circuit, and that every relay armature has a local battery and a sounder or register attached to it. The key operates the relay magnet; the relay magnet operates the armature (by attracting without touching it); and the armature works the sounder or register in the same manner that the key affects the relay. The movement of the armature is feeble, but powerful enough to open and close the local, which, on account of the little resistance in so few feet of wire, operates the sounder with many times the force of the armature.

The binding screws fastening the wires *o n* to the relay are permanently connected with the armature and posts by wires beneath its base.

On *very short* lines, where it is desired to use sounders *without* relays, the sounders will occupy the position of the relays, and the local circuits will be omitted.

MANAGEMENT OF INSTRUMENTS, WIRES, AND BATTERIES.

Ground Wires.

If to a line from New York to Washington, having a main battery at the latter place only, some conducting substance be joined, and then connected with the earth as at Philadelphia, the current will pass over this conductor and return to Washington, and no electricity will reach New York to operate that instrument. All machines between the conductor in question and Washington will be worked. Such a wire is named the *ground wire*, and every intermediate office is supplied with one to be used only in case of trouble on the line. When gas or water pipes enter an office, the ground wire is attached to them. Stations not having this excellent means of ground connection fasten a wire to a plate or rod of metal, and bury the piece of metal so that it is always in contact with moist earth.*

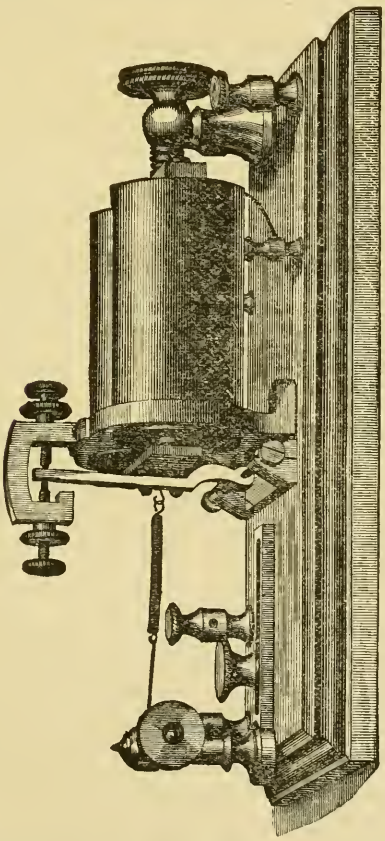
If Philadelphia puts his ground wire in contact with the line south of his instrument, and there is a main battery at each end of the line, the currents from both batteries will go only to this ground wire, and passing over it, to or from the earth, as the case may be, will return again to their respective batteries. During this state of things—the current from New York reaching the Philadelphia Machine—these two offices can communicate with each other. The current from Washington not quite reaching the instrument at Philadelphia, does not permit the latter city to hold communication with any office south of it; but Baltimore and Washington can work together at the same time that New York and Philadelphia do. The ground wire divides the line into two independent circuits, and forms a common

*A ground plate should have an area of at least three square feet, and be buried in a perpendicular position.

conductor for both currents, on the same principle that the earth forms one half of every main circuit.

Breaks.

Let the line so break between Philadelphia and Baltimore that the ends fall on the ground, and two entirely distinct lines will be the result, and offices on the same side of the break will work with each other as if nothing had happened. Should the southern end of a break be so near a pole as to hang in the air, the circuit south of it would be left open, and Baltimore, in order to work with Washington, would have to complete the circuit with his ground wire. Should he apply it south of his instrument, the current (from Washington) would pass over the ground wire before quite reaching his machine, and his inability to work would show trouble on the line north of him.



TILLOTSON RELAY, NO. 1.

The northern end of the break being on the earth, Philadelphia does not use his ground wire to effect communication with New York, but his inability to raise either office south of him, after repeated efforts, leads him

to suspect some difficulty on the line. Then by applying his ground wire north of his instrument, he finds there is no current from the Washington battery. This simply shows him that the line is in some way connected with the earth between him and Washington, probably north of Baltimore, because he cannot be raised; but it by no means proves that the wire is broken.

Should the circuit get open between the two points in an office where the ground wire is applied, no current could be made to pass through that instrument by the use of the ground wire: therefore, whenever an operator cannot get a current from either direction, he should carefully search this portion of the main circuit in his office for an opening in it.

Escapes.—In picturing a line and its workings, thus far, it has been the supposition that when *any* of the current on a line is broken, *all* of it is, and that the entire current always goes the whole length of the line. This is what is desired, but circumstances frequently render it impossible. Returning again to the same line, and placing a wet rope or a stick of green wood so as to touch both the line and the earth at Philadelphia, we find that only a *portion* of the current passes through the rope or wood, while the *remainder* of it follows the entire length of the line.

Now let New York open his key, and he will take from the line all the current from his own battery, and that portion of the Washington current, which does not pass over the poor conductor touching the line at Philadelphia; in other words, he will interrupt just what reaches his key. That from the south, finding its way through the green wood, is still passing over the line from Philadelphia to Washington, and partially magnetizing the relays on this portion of the route, and keeping the local circuits closed when they are wanted to be open, unless the relay spring has sufficient tension to overcome the residual attraction. This leakage of the current from the line to the ground, passes under the name of *escape*. Offices on the same side of an escape can communicate with each other as usual, but it is difficult, and sometimes impossible, for an office on one side receiving writing from another station beyond the partial ground wire. Some lines are much annoyed in this manner by the interference of trees, and all lines are affected by rainy or foggy weather. In wet weather every pole and insulator becomes a feeble conductor—and, perhaps, the air itself—thus offering so many inducements for the current to run down to the earth that sometimes it cannot be made to go over fifty miles from the battery, and, of course, a dispatch can be sent no greater distance.

If Washington, testing an escape to determine its location, has Baltimore open his key, and then he (Washington) tries to operate his own instrument but cannot do so—because there is no current left on that end of the line—he knows the escape to be north of Baltimore. Now, if Baltimore closes his key, and the one in Philadelphia is open, and Washington finds that he can work his own machine, or perhaps communicate with Baltimore, it proves an escape to exist between Baltimore and Philadelphia. Again, if Washington finds a little current left on the line while Baltimore is open, and a still stronger one while Philadelphia has his key open, it shows an escape in two places. To clearly understand the ill effects of escapes, it must be borne in mind that *sending* is a systematic putting on and taking off the current, the cessation being equally as important as the continuance of it. Anything preventing a current from passing on the line is no more injurious than that which will not allow it to be interrupted. The portion of the current which can be broken is all that any use is made of; all the escape is not only of no utility, but it is a real hindrance to an advantageous employment of that remaining on the line.

It sometimes happens that the operating table becomes wet, or is made of wood only partly seasoned, so that a portion of the main current finds a passage through the moisture of the table while the key on it is open. This does not conduct any of the current to the earth, and cannot, therefore, be properly called an escape, though *every* relay in circuit with a key on a

moist table must have a high adjustment to receive the writing from such a key. This trouble, however, does not in the least interfere with such office in receiving from other stations, nor does it at all affect other offices in working with one another.

Crosses.—Another annoyance, of frequent occurrence on some lines having two or more wires on the same poles, are "crosses," or contact of the different line wires with each other—which, so far as their utility is concerned, reduces to *one* wire all the wires thus joined. Each wire crossed acts as a long ground wire to the others in contact with it. Suppose two wires, designated by Nos. 1 and 2, running on the same pole from New York to Washington, to be twisted together between Philadelphia and Baltimore. Next, suppose No. 1 to be left open in New York, and No. 2 in Washington; now, commencing at New York on No. 2, which is closed, and tracing southward over this wire until the cross is reached, and from that point over No. 1 to the southern terminus, we find a complete circuit, though both wires are open; consequently, Washington and Baltimore, on No. 1, can work with Philadelphia and New York on No. 2. If Washington keeps both wires closed, New York or Philadelphia can operate both wires south of the cross by leaving either wire open and writing on the other, because the one wire north of the cross becomes the common conductor for both south of it. This is one mode for detecting and locating a cross. Another method is for New York to ask Philadelphia to try him on No. 2 with No. 1 open, while New York, doing just the reverse, tries Philadelphia on No. 1 with No. 2 open; and, if they can work with each other on different wires, it shows those wires to be crossed between them. If they cannot get each other, New York tries the same thing with Baltimore, and so on until he gets to an office with which he can work on a different wire. This test determines the cross to be between such office and the first one from that station toward New York. When several wires become tangled, and at different places on the line, the task of locating becomes much more lengthy and difficult, on account of first getting the different offices to test with.

If, instead of opening one wire, New York or Philadelphia should try to work one of them with the other closed, he would operate only that one wire north of the cross, for the other wire north and to the south of it would still form a perfect circuit. The same principle holds true for any number of wires so joined—all but one being useless so long as they remain together, or at least between the two offices nearest the cross, and between which the cross is situated. In case of a cross of two wires between Philadelphia and Baltimore, it is necessary to leave one of them open only between these two cities. The offices may open No. 2, so that New York and Washington may communicate over No. 1; then Philadelphia may put his ground wire on No. 5, leaving it open south of the ground, and work with New York, while Baltimore, in a similar manner, communicates with Washington.

Reversed Currents.—If on a line from New York to Washington two main batteries be placed, with both positive or both negative poles connected with the earth, no current will pass over the line, though the circuit is complete—for each battery will oppose the other, stopping all galvanic action. With the batteries thus located, let Philadelphia or Baltimore put his ground wire on in either direction, and he will get a current, for the ground wire divides the line into two distinct circuits, each of which will operate without interfering with the other. This is the only case in which there can be a current *each* way with a ground wire on, and *no* current with it off.

An intermediate station, wishing to connect a main battery to the line, first finds out, from some office already having one, the direction of the poles of his battery; but the same thing may be determined in other ways.

Where the current from a powerful battery is passed through the arm of an individual, a greater shock is experienced in the arm connected directly with the zinc or negative pole than in the other.

If a circuit be opened, and both ends of the break dipped into water, decomposition of the water will ensue, and the greatest volume of gas will rise from the wire leading directly to the negative pole. Therefore, the positive pole of another battery, required to be put in circuit, must be connected to the wire giving the greatest shock, or evolving the most gas.

ADJUSTMENT AND CARE OF INSTRUMENTS.

The distance through which the armature of the relay should move is very small—say equal to once the thickness of good writing paper. Magnets always retain more or less attraction, even when the circuit is perfectly broken, so that the spring on the armature must always have some tension, and a great deal more during a humid atmosphere than while the air it clear and dry. This tempering of the relay spring according to the amount of magnetism, while a key is open, is *adjusting;* and it is *high* or *low*, as the force of spring is great or small. *This duty is the most important one connected with the management of instruments.* It not only needs to be done several times a day, under the most favorable circumstances, but, from a few times daily, the frequency increases, until the operator must keep hold of the screw *S*, Fig. 5, regulating the spring—turning first one way and then the other nearly all the time he is either sending or receiving. Sometimes the slightest variation from a certain point, in either direction, will cause the instrument to cease working. Under such circumstances adjusting is very difficult, but in a large majority of instances it requires only the memory and the will to do it. The tempering of the relay spring is also perplexing, as well as the location of the trouble difficult, when a cross or an escape is a "swinging" one; that is, when a wire keeps swinging against another or against a tree, but remaining in contact only a short time.

Thunder storms vary the current over a line so suddenly and to such a degree as to cause the most difficult adjustment, at times rendering transmission utterly impossible, besides endangering the wire of the relay magnet, which is sometimes burned with a flash, accompanied by a sharp report.

The Aurora Borealis sometimes influences the wire in a similar manner, but less violently, never causing any harm other than a suspension of business. Several forms of *lightning arresters* have been made and used for conducting atmospheric electricity from the line to the earth. It matters but little whether it is led to the ground or not, if it is only diverted from the relay magnet. Every operator can make one of two pieces of wire and a phial of water. A short piece of wire (six inches long), considerably larger than that in the relay magnet, runs from each main circuit binding screw of the relay, and the ends dipped into a small bottle of water, forms one of the best protections against lightning. The distance of the wires from each other in the water, as also their depth in it, may be varied, but they must not be allowed to come together. Water being a poor conductor of galvanic electricity, only a small portion of the current will pass through it, tho larger part choosing the magnetic wire; but atmospheric electricity, being possessed of enormous intensity, prefers the short water route. None of these devices, however, are an absolute safeguard; but during a severe thunder storm relays should be disconnected from the line, and in such a manner as to leave no break in the main circuit.

The local circuit, being confined to the office, is subject to none of the fluctuations of the main. The local battery simply grows weak by use, when it has to be renewed. The spring on the arm of the local (sounder or register) magnet merely requires weakening as the battery working it becomes exhausted. The iron part of this arm must never come so near the poles of the magnet that one thickness of ordinary writing paper will not pass between them. If permitted to touch, the magnet discharges slowly. The same truth applies to the relay magnet and its armature.

The platinum points of the key, and more frequently those of the arma-

ture of the relay, burned and roughened by the current, sometimes fail to break circuit. The remedy is to rub them gently with a very fine file, or draw them between a strip of clean paper.

If a relay "sticks" (fails to break circuit,) it troubles only the office where that relay is located. If a key "sticks," it interferes with both sender and receiver.

MORSE CHARACTERS.

A - —	O - -	1 - — — -	Period - - — — - -
B — - - -	P - - - -	2 - - — - -	Comma - — - —
C - - -	Q - - — -	3 - - - — -	Semicolon - — - — -
D — - -	R - - -	4 - - - - —	
E -	S - - -	5 — — — —	Interrogation — - - — -
F - - — -	T —	6 - - - - - -	Exclamation — — — — -
G — — -	U - - —	7 — — - -	Parenthesis - — - - —
H - - - -	V - - - —	8 — - - - -	Italics — - - - —
I - -	W - — —	9 — - - —	Paragraph — — — —
J — - — -	X - — - -	0 ———	
K — - —	Y - - - -		
L — — —	Z - - - -		
M — —	& - - - -		
N — -			

(The above Comprehensive article is taken from "Smith's Manual of Telegraphy," by permission of the Publishers.)

For the benefit of any who may be desirous of learning telegraphy, we here append a catalogue or price list of telegraphic materials adapted especially to the use of students of this fascinating and lucrative accomplishment.

INSTRUMENTS, BATTERIES AND MATERIALS,

Especially adapted to the requirements of *Learners of Telegraphy, Schools, Colleges,* and the operation of *all Short Telegraph Lines.*

THE EXCELSIOR TELEGRAPH INSTRUMENT.

See Cut on page 345.

(Patented June 24, 1873.)

This apparatus is especially adapted to the requirements of the student of telegraphy, and for the operation of private telegraph lines from a few feet to several miles in length,

A really good and durable Telegraph Instrument at a low price has long been needed by the public, as telegraphy has become a necessary part of the business education of all.

The "Excelsior Telegraph Instrument" fully meets this great want, as it is simple in construction that we are enabled to make it of the best material and workmanship for the exceeding low price of SIX DOLLARS AND FIFTY CENTS COMPLETE, full size pony sounder and key, finely finished, and mounted on a mahogany base. Same, with Lightning Arrester and Cut-out attached, for $7,50.

STUDENT'S OUTFITS AND PRICES.

No. 1,—Student's Outfit for one office, viz., Instrument complete, 1-Cell Hill Battery, Chemicals for same, 8 feet Office Wire, 1 copy Smith's Manual of Telegraphy	$ 7 50
Two No. 1 Outfits	14.50
No. 2.—Outfit for two offices and 50 feet of Line, viz.: 2 Instruments, complete, 100 feet Insulated Wire, 4 Porcelain Insulating Knobs, 3-Cell Hill Battery, 2 Smith's Manuals	16.00
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Extra Battery, per cell	.65
Jar	.20
Copper	.13
Zinc	.25
Hanger	.10
Office Wire, per foot	.01
Line Wire, No. 12, Galvanized, per yard	.02
" " " per mile	22.00
Insulator, with Brackets and Spikes	.16

BUNNELL'S LEARNERS' INSTRUMENT.

SEE CUT ON PAGE 314.

Complete and Perfect, full-sized Sounder and Key combined, with Book of Instruction, Battery, Wire, and all Necessary Materials.

[Since the invention and introduction of these instruments, less than two years since, four thousand sets have been sold and put in operation throughout the country, giving the most perfect satisfaction to everybody.

These sets are made in the best manner, and are just exactly the thing wanted for Learners' Uses, for Telegraph Schools, or for Short Lines from a few feet to twelve miles long.

Learners' Instrument complete, with Battery, Book of Instructions, Wire, and all necessary materials to put in operation, singly or on a Short Line	$8.50
Learner's Instrument, without Battery, &c	6.50
Ornamental Learner's Instrument, Rubber Covered Coils, &c	7.50

Same Instruments, wound with finer wire so as to operate satisfactorily lines up 12 miles in length, $1.00 in addition to the above prices.

Extra Battery	per cell,	$1.50
Battery Jars	each,	.50
Zinc	"	.40
Coppers	"	.25
Zinc Hangers	"	.35
Blue Vitriol	per lb.	.15
Covered Office Wire	per foot,	.1
Smith's Manual of Telegraphy		.30

LEARNERS' SOUNDERS AND KEYS ON SEPARATE BASES.

SAME STYLE AS SHOWN IN CUT OF LEARNER'S INSTRUMENTS.

Learner's Sounders	$3.50
Learner's Sounders, with rubber covered coils	4.00
Learner's Keys, fine finish	3.00

THE NO. 5 TELEGRAPH KEY.

SEE CUT ON PAGE 342.

Price, finely finished, Straight Lever	$3.25
" " " Curved Lever	3.50

These keys are made of the same metal, and are as well constructed and finished as the No. 1 instruments, the only difference being in the size.

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SEE CUT ON PAGE 313.

Patented May 31, 1870.

For Students, Colleges, etc. No Battery required.

Price $7.00. Silver Plated, Extra Finish, $10.

EXCELSIOR LIGHTNING ARRESTER, CUT-OUT AND GROUND SWITCH COMBINED.

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This is an excellent and complete combination at a very low price, answering all the above purposes in connection with amateur telegraphy. Price, $1,50.

TILLOTSON'S PREMIUM REGISTER.

SEE CUT ON PAGE 320.

With weight or spring; a perfect sounder with the paper in or out. The most complete Morse Register ever constructed.

No. 1, with Spring, Premium pattern, complete	$47.50
" 1, Tillotson's Premium	45.00

All the instruments and material referred to in this work can be procured at the most reasonable prices of MESSRS. L. G. TILLOTSON & Co., MANUFACTURERS OF AND DEALERS IN TELEGRAPH INSTRUMENTS AND MATERIAL OF EVERY DESCRIPTION, No. 8 DEY STREET, NEW YORK, or we will obtain them and forward if desired. All persons writing us for information in regard to telegraph matter will please enclose a three cent postage stamp, otherwise we will not pay any attention to their communication.

Orders by mail and telegraph for any Instruments, Batteries, or Telegraph material herein described, in large or small quantities, will have as prompt attention as though ordered in person. Give your address in full, including County and State. To prevent loss, Remittances should be sent by Postal Money Order, Draft, Registered Letter, or by Express. Orders for goods to be sent C. O. D. to points far distant from New York, should be accompanied by remittance amounting to one-third of the bill ordered.

ARTIFICIAL FLOWERS, FRUIT, &C.

How Wax, Feather and other Flowers, Leaf Impressions and Fruit are Made and Preserved.

Wax Flowers and Fruit.—The modelling of flowers and fruit in wax is an easily acquired art, and one which is encouraging in its results. The materials for commencing the process will cost but little; they may be obtained at most fancy repositories, and specimens of the latest improvements and novelties may be seen at the same time at these places. The petals, leaves, etc., of flowers are made of sheets of colored wax, which may be purchased in packets of assorted shades. The stems are made of wire of suitable thickness, covered with silk, and overlaid with wax; and the leaves are frequently made by pressing thin sheets of wax on leaves of embossed calico. Leaves of various descriptions are to be obtained of the persons who sell the materials for wax-flower making. The flowers, leaves, and buds of artificial flowers will serve as the base of their wax models. The best guide to the construction of a flower is to take, say a tulip, a rose, or a camellia (procuring, if possible, two flowers nearly alike), and carefully picking one of them to pieces, lay the petals down in the order in which they are taken from the flower, that you may know their relative positions. The natural flower will be a guide in getting the wax petals together, and will enable the operator to give not only to each petal, but to the contour of the flower, the characteristics which are natural to it. In most cases, they are merely pressed together, and held in their places by the adhesiveness of the wax. From the paper patterns, the wax petals or other portions of the flowers, may be cut. They should be cut singly by scissors, rather loose at the points, and the scissors should be frequently dipped into water, to prevent the wax from adhering to the blades. The scraps of wax which fall from the cutting will be found useful for making seed vessels and other parts of flowers. Very few and very simple instruments are required, and these may be purchased at the places where the other materials are obtained. Where the manufactured formations of leaves cannot be obtained, patterns of them should be cut in paper, and the venous appearance may be imparted to the wax by pressing the leaf upon it. In the construction of sprigs, it is most important to be guided by sprigs of the natural plant, as various kinds of plants have many different characteristics in the grouping of their flowers, leaves, and branches. For the tints, stripes, and spots of variegated flowers, colors will be supplied from amongst the other materials, and the application of them is precisely upon the principle of water-color painting.

For the making of waxen fruit, the following instructions are to observed:—The materials of which moulds are composed should be of the best plaster of Paris, which can be bought from the Italian figure makers. If this can not be procured, the cheaper plaster may be substituted, if it can be procured quite fresh. The mould must be made by an impression from the object to be imitated, made upon the plaster before it sets; and, for early experiments, an egg, boiled hard, will be found efficient. Having filled a small basin about three-quarters full of fine damp sand, lay the egg lengthwise in the sand, so that it is half above and half below the level of the sand, which should be perfectly smooth around it. Then prepare the plaster in another basin, which should be half full of water; sprinkle the plaster in quickly till it comes to the top of the water, and then, having stirred it for a moment with a spoon, pour the whole upon the egg in the other basin. While the half mould thus made is hardening thoroughly, carefully remove every particle of plaster from the basin in which it was mixed, and also from the spoon which has been used. This must be done by placing them both in water, and wiping them perfectly clean. This is highly important, since a small quantity of mortar which has set will destroy the quality of a second mixing. In about five minutes, the half mould will be fit to remove, which may be done by turning the basin up with the right hand (taking care not to lose the sand), so that the mould falls into the left hand; the egg should then be allowed to fall back gently on the sand ont of the mould. The egg being removed and laid aside, the mould must be trimmed; that is, the sand must be brushed from the flat surface of the mould with a nail brush, very slightly, without touching the extreme and sharp edges, where the hollow of the mould commences. Then upon the broad edge, from which the sand has been brushed, make four equidistant hollows, with the round end of a table knife; these are to guide hereafter in the fixing of the second half of the mould. The egg should now be replaced in the mould, and the edge of the cast, with the holes, thoroughly moistened with sweet oil, laid on with a feather or camel-hair brush. Into the basin from which the sand has been emptied, place, with the egg uppermost, the half mould, which should fit closely at the edges to the side of the vessel, then prepare some more liquid plaster as before, and pour it upon the egg, and the mould, and, while it is hardening, smooth it round with a spoon, as with the first half. In due time, remove the whole from the basin; the halves will be found readily separable, and the egg being removed, the mould is ready to cast in, after it has been set aside for an hour or two, so as to harden completely. For the first experiment, common yellow wax may be used, or the ends of partially used wax or composite candles. Every large object to be imitated in wax should be cast hollow; and therefore, although the transparent lightness required in the imitation of fruits is not requisite in an artificial egg, yet, in this instance, in order to render the instructions conformable with the principle, the egg will be cast as if it were fruit. The operator must now proceed as follows:—Soak the two pieces of plaster of Paris in hot water for ten minutes. In the mean time, melt the wax very slowly in a small tin sauce-pan with a spout to it, care being taken not to allow the wax to boil, or it will be discolored; a lump of wax, the size of the object to be imitated, will be sufficient for casting twice at least. As soon as the wax is thoroughly melted, place the saucepan by the side of the fire, and, taking the parts of the mould from the hot water, remove the moisture from their surfaces by pressing them gently with a handkerchief or soft cloth. The mould must not be wiped, but only pressed. Having laid the two halves of the mould so that there can be no mistake in fitting the one in its exact place quickly on the other, pour from the saucepan into one of the half moulds nearly as much wax as will fill the hollow made by the model, quickly fit the other half on the top of it, squeeze the two pieces tightly together in the hand, and, continuing to hold them thus, turn them over in every possible position, so that the wax, which is slowly congealing in the internal hollow of the mould, may be of equal

thickness in all parts. Having continued this process for at least two minutes, the hands (still holding and turning the mould) may be immersed in cold water, to hasten the cooling process. The perfect congealment of the wax may be known, after a little experience, by the absence of the sound of fluid on shaking the mould. As soon as the mould is completely cooled the halves may be separated carefully, the upper half being lifted straight up from the under half, and if the operation has been properly conducted, a waxen egg will be turned out of the mould. The egg will only require trimming, that is, removing the ridge which marks the lines at which the halves of the mould were joined, and polishing off the scratches or inequalities left by the knife with a piece of soft rag, moistened with spirits of turpentine or spirits of wine. It is always desirable, when the materials and moulds are prepared, to make several castings of the same object, as the moulds are apt to become chipped when laid by in a cupboard ; and for this reason, as well as for the sake of practice, beginners are advised to make at least a dozen waxen eggs before any other object is proceeded with. If success attends these first efforts, every difficulty in subsequent operations will be easily overcome To color wax, stir into it while it is by the side of the fire, a little flake white in powder, and continue to stir the mixture while it is being poured into the half mould. The fixing and shaking of the moulds must be performed quickly, or the coloring matter will settle on the side of the half into which the mixture is poured. To produce a good imitation of the surface, in the first place, very slightly prick with a fine needle the surface of the object, and then, having smeared it with spirits of turpentine, rub the surface all over, so as nearly to obliterate the marks of the needle-point. The simple operation thus described constitutes the fundamental process of waxen fruit and flower making ; and in the same manner as the egg is treated, oranges, lemons, large gooseberries, small cucumbers, etc., etc., may be operated upon.

Feather Flowers.—Procure the best white geese or swans' feathers, have them plucked off the bird carefully so as not to break the web, and free them from down, except a small quantity on the shaft of the feather. Having procured two good specimens of the flowers you wish to imitate, carefully pull off the petals of one, and with a piece of tissue paper, cut out the shape of each size, taking care to leave the shaft of the feather at least half an inch longer than the petal of the flower. Carefully bend the feather with the thumb and finger to the proper shape, being cautious not to fracture the web. *To make the stem and heart of a flower*, take a piece of wire six inches long ; across the top, lay a small piece of cotton wool, turn the wire over it, and wind it round, until it is the size of the centre of the flower which is being made. If a single flower, cover it with paste or velvet of the proper color, and arrange the stamina round it ; these are made of fine Indian silk, or feathers may be used for this purpose. After the petals have been attached, dip the silk or feather into gum, and then into the farina. Place the petals around, one at a time, and wind them on with Moravian cotton, No. 4 ; arrange them as nearly-like the flower you have for a copy as posssible. Cut the stems of the feathers evenly, and then make the calyx of feathers, cut like the pattern or natural flower. For small flowers, the calyx is made with paste. Cover the stems with paper or silk the same color as the flowers ; the paper must be cut in narrow strips about a quarter of an inch wide. *To make the paste of the calyx, heart, and buds of flowers,* mix common white starch with gum-water until it is the consistence of treacle ; color it with the dyes used for the feathers, and keep it from the air. *To make the farina,* use common ground rice, mixed into a stiff paste with any dye ; dry it before the fire and when quite hard, pound it to a fine powder. The buds, leaves, and hearts of some double flowers are made with cotton wool wound around wire, moulded into shape with the thumb and finger. Smooth it over with gum-water, and when dry, cover the buds, leaves or calyx with appropriately colored pastes ; they will require one or two coats, and may be shaded with a little paint, and

then gummed and left to dry. Flowers of two or more shades or colors are variegated with water colors, mixed with lemon-juice; ultramarine and chrome, for blue and gold, may also be used in powder, mixed with lemon-juice and gum-water. Feather-flowers thus made prove an easy and inexpensive accomplishment, and yield pretty ornaments for the chimney-piece, chiffonier, &c.

Flowers, Preservation of.—Flowers may be preserved in a fresh state for a considerable time, by keeping them in a moist atmosphere. Another method, by which some flowers may be preserved for many months, is to carefully dip them, as soon as gathered, in perfectly limpid gum-water; and after allowing them to drain for two or three minutes, to set them upright, or arrange them in the usual manner in an empty vase. The gum gradually forms a transparent coating on the surface of the petals and stems, and preserves their color and figure long after they have become dry and crisp. *Faded flowers may be generally more or less restored* by immersing them half-way up their stems in very hot water, and allowing them to remain in it until it cools or they have recovered. The coddled portion of the stems must then be cut off, and the flowers placed in clean cold water. In this way a great number of faded flowers may be restored, but there are some of the more fugacious kinds, on which it proves useless. Flowers may be produced in winter by taking up the plants, trees, or shrubs, in the spring, at the time when they are about to bud, with some of their own soil carefully preserved around the roots, and placing them upright in a cellar till Michaelmas; when, with the addition of fresh earth, they are to be put into proper tubs or vessels, and placed in a stove or hot-house, when they must be treated in the usual manner. By this method in the month of February, fruits or roses will appear. Flowers sown in pots about Michaelmas, may thus be made to bloom at Christmas.

Leaf Impressions.—To take perfect impressions of the leaves of plants, the following process should be adopted: Hold oiled paper in the smoke of a lamp, or of pitch, until it becomes coated with the smoke; to this paper apply the leaf of which you wish the impression taken, having previously warmed it between your hands, to render it pliable. Place the lower surface of the leaf upon the blackened surface of the oiled paper, in order that the numerous veins which are so prominent on this side may receive from the paper a portion of the smoke. Lay a paper over the leaf, and then press it gently upon the smoked paper, either with the fingers, or, better still, with a small roller, covered with woollen cloth, or some soft material, so that every part of the leaf may come in contact with the smoke on the oiled paper: a coating of smoke will thus adhere to the leaf. Then remove the leaf carefully, and place the blackened surface on a sheet of clean white paper, covering the leaf with a clean slip of paper, and pressing upon it with the fingers or the roller as before. Thus may be obtained the impression of a leaf, showing its perfect outlines and veins, more accurately than in the most careful drawing.

ARTISTS AND PICTURES.

The Manner of taking Ferrotype, Tintype, and other Positive Pictures, Formulæ for Photographers, Painting in Oil Colors, Water Colors, &c.

Process for Making Ferrotypes, *or any other Positive Picture.*—First, articles to be used chemically. Nitrate of silver, 1 oz., Iodide of Potassium, 6 grs., pure soft water, 12 ozs. To combine the above for bath, use a clean bottle, dissolve in the 12 ozs. water 1 oz. Nitrate of silver, shake well and add the Potassium, let stand over night in the dark room, then by placing in the small end of a glass funnel, a little nice cotton wool, filter the solution into another clean bottle, repeating the operation the second time when it is ready to be used. *For Developer.* Saturated sol. Sulphate of Iron and water, 4 ozs., Acetic Acid, 2 ozs., best Alcohol, 2 oz., soft water, 12 ozs. To combine the above, take 4 ozs., Saturated Solution of Iron, add 12 ozs. soft water, 2 ozs. Acetic Acid, No. 8, 2 ozs. best Alcohol. Shake well, and filter as you did the Silver, always having a funnel expressly for this purpose. *Fixing Solution.* Take a piece of Cyanide Potassium, dissolve in water, so that the picture on trial clears up readily, a single trial will show you. *Collodion,* and how to make it. Take 5 ozs. Concentrated Ether, 5 ozs. best Alcohol. Dissolve and add 108 grs. Iodide Ammonium, 35 grs. Iodide Cadmium, 30 grs. Bromide Cadmium, shake well and add sufficient Gun Cotton, say 4¾ to 5 grs. to the oz. of solution. This you first coat your well cleaned Plate with, when it is well set, so that it does not adhere to the finger on application, it is ready to be immersed into the Bath Holder which contains your well filtered solution—it is lowered into it by placing it on a dipper (either of glass or Gutta-Percha) by regular movement, as a stop or irregular motion may cause lines, etc.; allow it to remain 3 or 4 minutes with the door of Dark room closed, than by the light from your yellow curtained window, place in the shield adapted to the size you are to use, already having put your subject in proper position. The time of Exposure depends on the light you are having and the time of day, the longer the exposure the lighter the figure will appear. After taking the exposed plate from the shield, first pour over it smoothly, the developer, keep the plate in motion so as to hold the solution on the plate, and also to give it an even developing; when it is properly done pour off the liquid into the Dish; you should develope over and immediately let the water on it from your Tank, always placed convenient for the purpose. After the oily appearance all disappears it is ready to be placed into the dish of the Fixing Solution; then remove all of it, by thoroughly washing under your Tank Faucet. After this the Picture may be allowed to dry by any heat, or may be dried by a Spirit Lamp, when it will be in order to finish by pouring over it (as you did the Collodion), a nice preparation of Crystal Varnish or any other approved Varnish made by responsible manufacturers. Having

named and explained the different Solutions will now give in detail the the Articles used. As an Apparatus, 1st, Camera Tubes, Boxes to suit, Shields to suit, Dippers for Bath holder, Baths for Solution, Developing Bottle and Dish, Fixing Bottle and Dish, Collodion Vials, Blenders and Little Brushes, Colors, Gilt, etc., Camera Stand. The foregoing named articles must be good in every respect. Shears, Hydrometer, Glass Funnels, Scales and Weights, Graduating Glass, Head Rests, Photo Chair, Key and Diamond, Plates of different sizes, Mats of different sizes, Show Mat and Frame, India Ink, Screw Eyes, Frames, Frame points, Picture Holders, Sticking Paper, Cyanide, Iod. Ammonium, Iod. Cadmium, Bro. Cadmium Gun Cotton, Ether, Pot of Varnish, Bottle of Collodion, Acetic Acid, Nitric Acid, Iron, Distilled Water, Faucet, Litmus paper, Hammer, Gimlet, Awls, and Tools. A skylight should face the Northwest, always avoiding the South and East if possible. The Background to be placed at the Southeast end of your Room. The Dark room to the rear of Camera, in the West corner if convenient; your stairway, if you occupy chambers in the East corner. With a 12 by 12 ft. light or even smaller, moderately low, with a good angle,—at mid-day, and chemicals properly combined, 12 or 14 seconds should be exposure sufficient; morning light is always softer and better, and cloudy weather should not be objectionable. The interior of surroundings of wood work to the skylight ought to be blue, as also those parts of partitions, frames of windows, etc., never should be the same, it is so much milder for the eye. *The Process in detail.* A customer enters, finding the Artist engaged in close secrecy, his dark room clean, and his chemicals all ready for operation. "Good morning, Mr. Artist; is this a favorable time for procuring nice pictures?" "Oh, certainly, very fine, take a seat; I am ready as soon as you adjust your hair, etc." "What is your price, sir?" "Well, my prices vary according to the size and description desired." "Allow me to look at your samples." "Oh, yes." "Very well, I think the card size will suit me, these you charge 50 cents for single, or 4 for $1, all right; now don't make them too dark. Most all the pictures I have are ugly looking, but I wish to mail these to parties I never saw, and desire to have them look very nice, even if they resemble somebody else." "Certainly, you are perfectly correct, I imagine, however, you will make a very fine picture, sit right down, look natural as a fool, keep quiet, and when 'tis done you can get up." The artist goes to the Dark room and by the door, holds his plate in the left hand by the lower left hand corner, with a soft brush in the right, removes carefully any trace of dust from both sides of the plate, thereby keeping the foreign substances from the Silver Solution, replacing the dust brush, takes the Collodion Vial with an easy and firm hold, and pours on the upper centre of the plate sufficient Collodion to coat the top surface, by gradually turning the upper part of plate downward, the upper left corner is coated then to the right and down, pouring back into the bottle from the lower right hand corner, and set the bottle down replacing its cover, change the plate to right hand, with the left forefinger try the coating and wipe off the surplus on the right lower corner, then with care lower into the Bath of silver. Then place your sitter in an easy position, avoiding bringing the hands too far forward, or in sight at all if possible, arrange the Camera directly in front, at proper height, bringing the nose a little above the centre of ground, or passing glass, placed in the rear end of Camera. When all is ready draw the ground glass, get the plate in the shield, and place it where the ground glass came from, give directions for the eye to rest on some object, which will avoid its having a crossed appearance, and give warning that you are about to shoot, and uncover without jarring the Camera; after the exposure cover carefully and adroitly the tube; and remove with the shield to dark room, closing the door, but first saying it is all right. Develope as previously explained, fix, dry, varnish, etc., and you will have a nice picture if the instructions have been followed and your Instruments and Chemicals are just what they should be.

RELIABLE FORMULÆ FOR PHOTOGRAPHERS.—No. 1. *Silver Bath for Albumen Paper, for Summer use.*—Crystal nitrate of silver, 40 grains; nitrate of ammonia, 35 grains; filtered rain water, 1 oz.; saturated solution bicarbonate of soda, about 8 or 10 drops, or enough to make the bath *slightly alkaline.* No. 2. *For winter use.* Nitrate of silver, 2½ ozs.; nitrate of soda, 2 ozs.; glycerine, 3 ozs.; pure water, 40 ozs. Make it a little alkaline with aqua ammoniæ. No. 3. *Another Silver Bath.* Silver, from 40 to 45 grs. (according to temperature;) nitrate of ammonia, 20 grs.; distilled or ice water, 1 oz. Float 45 seconds to 1 minute. No. 4. *Sal Soda Toning Bath.* Distilled or melted ice water, 64 ozs.; acid solution chloride of gold, (4 grs. to the oz.) 1 oz.; saturated solution of sal soda, ¼ oz. Make it a full half hour before you wish to use it, and during the cold weather use the water slightly warm. No. 5. *Chloride of Lime Bath.* Water, 40 ozs.; chloride of lime, 5 grains; chloride of gold, 4 grs. No. 6. *Bicarbonate of Soda Bath.* Chloride of gold solution (1 gr. to the oz. of water) 1 oz.; luke-warm water, 16 ozs.; bicarbonate of soda (saturated solution) 10 minims. Make up fresh every time you prepare to tone. Make half an hour before using. Precipitate the gold in the old solutions with protosulphate of iron. No. 7. *Fixing Bath.* Hyposulphite of soda, 1 part to 8 of water, and if the paper blisters in the washing, soap the prints for 5 minutes in a solution of common salt. No. 8. *Bath for Salting the paper.* Pure rain water, 60 ozs.; chloride of ammonium, 360 grs.; gelatine, 120 grs.

PHOTOGRAPH PAINTING IN OIL COLORS.—TINTS FOR THE FIRST PAINTING.—FLESH.—*White and Light Red.*—White, Naples yellow, and vermilion. White, vermilion, and light red. *Grey, Pearly, and Half Tints.*—White, vermilion, and black. White and terre verte. White, black, Indian red, and raw umber. *Deep Shades.*—Light red and raw umber. Indian red, lake and black. *Carnations.*—White and Indian red (powerful color). White and rose madder. White and lake. HAIR.—*Light Hair.*—White and yellow ochre. White and Roman ochre. White and Vandyke brown for the dark parts. White and raw umber for the dark parts. *Dark Brown Hair.*—Raw and burnt umber. White and raw umber. White and Vandyke brown. TINTS FOR THE SECOND AND THIRD PAINTING.—*High Lights.*—White and Naples yellow. *Carnations.*—Rose madder and white. Indian red, rose madder, and white. *Green Tints.*—White and ultramarine, with any of the yellows. White and terre verte, with the addition of a little raw umber. The above green tints may be converted into green greys. *Gray Tints.*—Ultramarine, light red, and white. Indian red, lake, black and white. White, ultramarine, Indian red, and raw umber. *Purple Tints.*—Any of the lakes or red madders, with ultramarine and white. *Powerful Shadow Tints.* Indian red, purple lake, and black. Indian red, raw umber, and black. *Strong Glazing Colors.*—Light red and lake. Brown madder. Vandyke brown, Indian red, and lake asphaltum. DRAPERIES.—BACK GROUND COLORS.—*Pearly.*—White, vermilion, and blue. White, vermilion, and black. *Gray.*—White, Venetian red and black. *Yellow.*—Yellow ochre and white. *Olive.*—Yellow ochre, terre verte, and umber. *Stone.*—Raw umber and yellow. Black, white, and raw umber. *Sky.*—French blue and white. French blue, vermilion, and white. *Edges of Clouds.*—Yellow ochre and white. *Clouds.*—Indian red, lake, and white. Brown madder, French blue, and white.

PHOTOGRAPH WATER COLORS.—FLESH TINTS.—No. 1. *Fair Complexion.* Light red, a little carmine or vermilion, and Indian yellow. Be careful in using the latter, and, in the flesh tints of very fair children, allow the vermilion to predominate; carnations, rose madder, and, if the face be full of color, add a little vermilion to it. 2. *Middling Complexion.*—Much the same as No. 1, saving that the light red must be in excess over the other colors—carnations, rose madder, and lake. 3. *Dark Complexion.*—Light red and Indian yellow, or light red and Roman ochre, and, if the complexion be generally ruddy, you may add a little Indian red, but it must be sparingly used, as it is a powerful color, and likely to impart a purple tone to the

flesh. Carnations chiefly lake, but if the complexion be warm, lake and a little yellow. The carnations for children's portraits are rose madder and vermilion, inclining more to the latter tint. Aged persons have rose madder, and a little cobalt to give a cold appearance to the color in their cheeks and lips. These tints, Nos. 1, 2, and 3, are indispensable as general washes, for the purpose of receiving the other colors, which are to be worked over them to bring up the complexion to the life. Uncolored photographic portraits vary so much in tone, that the beginner will, perhaps, find some difficulty in mixing up the tints for the washes. He must note that the warm-toned ones do not require so much Indian yellow as the cold ones do.

To Clean Old Oil-Paintings.—Dissolve a small quantity of salt in stale urine; dip a woollen cloth in the mixture, and rub the paintings over with it till they are clean; then wash them with a sponge and clean water; dry them gradually, and rub them over with a clean cloth Should the dirt not be easily removed by the above preparation, add a small quantity of soft soap. Be very careful not to rub the paintings too hard.

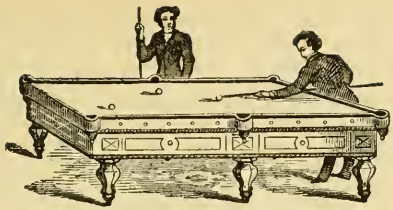
To Renew Old Oil-Paintings.—The blackened lights of old pictures may be instantly restored to their original hue by touching them with deutoxide of hydrogen diluted with six or eight times its weight of water. The part must be afterwards washed with a clean sponge and water.

To Transfer Pictures from Paper to Wood for Re-Engraving.—Soak the print in a saturated solution of alcohol and white caustic potash to soften the ink, then transfer to the block under roller pressure.

To Transfer Prints, &c.—Take of gum sandarac, 4 ozs.; mastic, 1 oz.; Venice turpentine, 1 oz.; alcohol, 15 ozs. Digest in a bottle, frequently shaking, and it is ready for use. Directions: use, if possible, good plate glass of the size of the picture to be transferred, go over it with the above varnish, beginning at one side, press down the picture firmly and evenly as you proceed, so that no air can possibly lodge between; put aside, and let dry perfectly, then moisten the paper cautiously with water, and remove it piecemeal by rubbing carefully with the fingers; if managed nicely, a complete transfer of the picture to the glass will be effected.

To Apply Decalcomanie Pictures.—Varnish the pictures carefully with the prepared varnish (which can be obtained with the pictures), with an ornamenting pencil, being careful not to get the varnish on the white paper. In a few minutes the picture will be ready to lay on the panel, and the paper can be removed by wetting it, and when thoroughly dry, it should be varnished like an oil painting. Be particular to purchase only those transfer pictures which are covered with a gold leaf on the back, for they will show plainly on any colored surface, while the plain pictures are used only on white or light ground.

To Print a Picture from the Print Itself.—The page or picture is soaked in a solution, first of potassa, and then of tartaric acid. This produces a perfect diffusion of crystals of bitartrate of potassa through the texture of the unprinted part of the paper. As this salt resists oil, the ink roller may now be passed over the surface, without transferring any part of its contents except to the printed part.



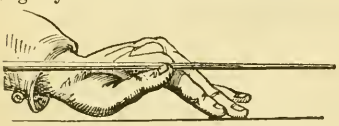
INDOOR GAMES.

Rules and Suggestions for Billiards, Dominoes, Cribbage, &c., &c.

Billiards.—A game played upon a table with balls propelled by a long round stick, termed a cue, and occasionally assisted in long or difficult strokes by a jigger or rest. In learning this game the first thing to be attended to is the *Bridge*, or support upon which the cue is to act. This is formed by the left hand of the player being placed firmly upon the table, at a distance of from six to nine inches from the ball that is to be struck, and drawn up until the hand rests only on the wrist and the point of the fingers; the latter being bent up to such an angle as to leave the palm considerably hollowed, at the same time that the thumb is elevated above the level of the knuckles, so as to form a furrow between it and the forefinger for the cue to slide in. The next matter of importance is to handle and adapt the cue in such a manner as to render it perfectly free and easy in its motion. This consists in grasping it about four or five inches from the broad extremity with the right hand, with sufficient force to enable the striker to use an adequate strength in his stroke, and yet free enough to allow of a considerable extent of motion. The bridge being made and the cue adapted, the next point to be attained is *how to strike the opposing ball* in a full, fair, and even manner. To accomplish this, the point of the cue (which should be rubbed over with a little chalk) ought, in the first place, to be made accurately to approach the centre of the ball. The cue should then be drawn four or more inches backwards, according to the strength required, slightly depressed towards the cloth, then gradually elevated till perfectly horizontal, and lastly forced against the ball, so as to drive it onwards, with more or less velocity, as occasion may require. The stroke should be made freely from the shoulder, and not in a cramped manner from the elbow, and the arm should be parallel to the side, not at an angle. Before making the stroke the learner should not only know where the balls will strike, but he should endeavor to calculate where they will be left. In order to accomplish certain strokes the position of the cue must be regulated accordingly, see page 663.

Attention to various circumstances is necessary, in order to play the game of billiards with delicacy and correctness; namely, the particular modification of the action of the instrument, with which the impulse is given to the ball, the proper regulation of the eye of the striker, the position he assumes in striking, and the mode in which he accommodates the instrument to his hand; the precise point of the distance or object ball, or of the cushion which is made to receive the stroke; and lastly, the degree of strength necessary to be employed in order to obtain the desired end. The accuracy of every stroke will very materially depend upon the proper regu-

lation of the eye of the striker; and this requires a great degree of nicety There are two objects to be attentively regarded nearly in the same instant; namely, the cue ball, or that to be struck with the instrument, and the object ball, or that to be struck at, in order to effect the desired hazard or carom. The position of the object ball should first be attentively marked, the cue is then to be adapted to the bridge formed by the hand, as before directed, and upon this the eye should be suffered to rest until the moment of striking; previous to the act of which it should be again carried to the object ball, and remain intently fixed on it until the stroke is completed. *The position in which the striker stands,* while in the act of playing, is also of essential importance; he should stand firmly on the right leg with the left slightly in advance and a little bent, the body nearly erect, or not more inclined forward than may be necessary for the left hand to rest with ease upon the table. This position should be steadily preserved until the stroke has been completed, and the arm be the only part moved during the act of striking. Particular attention should be paid by the novice to what are termed *the angles of the table,* or, in other words, the course which the balls describe by reverberation from the elastic cushion. A little practice with a single ball will soon bring the student into acquaintance with these principles. A very good plan to proceed upon is to make a chalk spot on the side or top cushion, and strike at it repeatedly with various degrees of strength, first from one and then from the other side of the angle. In this way the truth of the stroke will be proved, and it will soon be discovered how the different strengths and sides given to the ball affect the angles produced. Two or three hours' practice in this way will be sufficient to acquire the requisite knowledge. Then take two other balls, the white and red, and, placing them in the line of the angles observed, endeavor to produce the various caroms that lie within those angles. As soon as you have acquired a little intimacy, with the more common caroms, you can increase or decrease the distance between the balls, and so vary the practice in an infinity of ways. After the learner has mastered the angles of the table, his next preparatory step should be to make himself master of the several common winning and losing hazards. For this purpose he will find it expedient to begin with the *winning,* which may be considered as a key to billiards, generally speaking, for whoever can make a good winning hazard will find little difficulty in effecting every other which the table may present to him. The full or (straight) winning hazard should first be practised; beginning by placing the two balls near to each other, precisely in a line, and in the direction of a pocket, and upon that precise point directing the stroke of the ball. After a little practice has enabled him to strike this with ease at a short distance, he is to remove the balls farther asunder, and in the end make the extent of his stroke the whole length of the table. The learner should then proceed to practice the other winning hazards, namely, the three-quarter ball, half ball, third ball, quarter ball, and eighth ball. *Losing hazards* must occur more or less frequently in every game; and after the different degrees of strength and fulness requisite for each stroke have been once acquired, they are, of all other hazards, the most easily played, requiring only a little practice and attention.



The American, or four-ball game, is played with two colored balls and two white balls. The scores are made by winning hazards and caroms. The carom from a white to a colored ball counts two; from one to another colored ball, three points: three points are taken for each colored ball pocketed, and two for the white ball. At the commencement of the game one colored ball is placed on the winning spot, and the other on the centre spot on the baulk line. The non-player places his ball on the spot, and the striker at starting either hits it or gives a miss. The baulk is considered to

be all the space within the line, not the semicircle merely. The game is usually played 100 up; but may be played for any number of points.

Of late years the pocket table has gone out of use to a great extent except for playing pool, and as a general theory on carom tables each carom counts three whether made on the white or on the red ball.

RULES FOR THE GAME OF BILLIARDS.

American, or Four-ball Game.—1. The game commences by stringing for the lead, and the player, who, after striking his ball to the bottom cushion, brings it nearest to the cushion at the upper end of the table, wins the choice of lead and balls.

2. If, after the first player has strung for lead, his opponent should make his ball touch any other ball, or if he should pocket his own, he loses thereby his choice.

3. If the striker play with the wrong ball during the game, it is deemed a foul stroke, and consequently he cannot count; provided, the mistake be discovered before the second stroke is made. But, if more than one stroke be made with the wrong ball, without discovery, the player is entitled to all the points which he may have counted up to the time of discovery, and may continue his play.

4. If the balls of both the players should happen to be in hand at the same time, and he, whose play it is, should, through mistake, obtain his opponent's ball, and play with it under the impression that he was using his own, he is entitled to all the points he may make, and no penalty attaches to him for this mistake.

5. If a ball is discovered to have been changed during the game, and it cannot be ascertained by which player, the game must be played to the end, with the balls as they are.

6. If the striker is about to play with the wrong ball, no person in the room—not even the marker—has a right to disclose his error; and in a double match, his partner only is justified in doing so.

7. If the player, while in the act of striking his ball, touch it twice with his instrument, the stroke is considered foul.

8. In playing with the butt of the cue, the striker must withdraw it from his ball, before such ball comes in contact with the object ball.

9. The player has a right to use the bridge, or any other instrument pertaining to the game, at any stage of the play, unless it is otherwise stipulated in the commencement.

10. If the striker, by accident, should make his ball touch the other, while the balls are very near each other, it is considered a stroke, though not intended as such. But if a player, in the act of striking, is baffled or impeded by his opponent, or a spectator, he has a right to replace the balls, and re-commence the stroke; and any points made after the ball has been so replaced, are good, and must be counted.

11. If any person play at a ball while it or any other ball is rolling, the stroke is considered foul, and he is not entitled to any count he may have effected by such play.

12. If the striker, after having made a hazard or carom, interrupts the course of his or any other ball, the stroke is foul, and he cannot score the points he may have made.

13. After a red ball has been pocketed, or forced off the table, the striker is bound to see the ball placed on the proper spot again—provided, such spot be vacant before he strikes, for otherwise he can win no points while the ball is out of its place.

14. If the striker plays with the wrong ball, and at the same time makes a miss, or pockets it, he cannot score such count, but on the contrary, the same penalty attaches to him as if he had played with his own ball.

15. When a red ball cannot be placed on its proper spot, it must remain off the table until that spot becomes vacant, and the balls cease rolling.

16. If the striker's ball, standing at the edge of a pocket, should fall into that pocket, before the striker has delivered his ball from the instrument, so as to leave him no chance for a stroke, the ball must be replaced in its original position, and the player is entitled to repeat his stroke.

17. If the object ball falls into a pocket, before the player's ball, after being delivered from the instrument, can reach it, the rule is the same as above; both balls must be replaced as nearly as possible in their original position, and the stroke repeated.

18. Should your own ball, when it is your play, be in contact with another ball, you cannot count, but it is imperative on you to make such play as will separate the balls; and in this case, you lose no point, unless you pocket your ball, or cause it to jump off the table, and you then lose as in ordinary cases.

19. Once the player has separated the balls to the extent of one inch, it is not imperative on him to separate them a second time, though it is quite possible that they may "roll" together, and come in contact after the stroke is made.

20. If, during the game, a ball should happen to jump off the bed of the table, and lodge on the cushion, it is to be considered off the table; and if a red ball, it must be placed on its appropriate spot; but if it should be the player's ball, he forfeits as many points as if he had pocketed it.

21. When the striker's ball is in hand, he can play from any point within the string, but it is imperative on him to play his ball *outside* the string, and he can gain no points, unless it is played out, or passes beyond the string.

22. If the striker's ball be in hand, and the other balls within the string, and should he—either by accident or design—strike any of them, without first playing out of the string, it is optional with his opponent to let the balls remain as they are; to have them replaced in their original positions, or to compel the striker to play the stroke again.

23. If the striker's ball be in hand, and he play at the cushion within the string, for the purpose of striking any ball, he is not entitled to any count which he may effect by such play, and the opponent has the same option as in rule 22.

24. If a ball springs off the table, and strikes one of the players or by-standers, and is thereby caused to fall back on the table it is considered as much off the table as if it had fallen to the floor, and any count it may have effected cannot be scored by the player.

25. If the marker or any by-stander touch either of the balls—whether it is rolling or stationary—it must be placed as near as possible to the position it would apparently have occupied, if it had not been interfered with.

26. No person has a right to take up or remove a ball without the permission of his opponent.

27. No person has a right to disclose whether a stroke be fair or foul, until solicited; and in playing a double match, none but the opponents of the player have a right to inquire.

28. The striker can lose only two points by pocketing his own ball, or causing it to jump off the table—provided his own come in contact with a white ball in such stroke, before it entered the pocket, regardless of the points he would have made, if he had completed his play.

NOTE.—This rule is observed more particularly in New York and its vicinity; but in many parts of the United States, the player forfeits the number of points made on such stroke previous to pocketing his own ball.

29. A carom on all the balls counts five, irrespective of the particular balls which are struck first or last.

30. The opponent always is bound to see if the striker plays fair, which, if he neglects to do, the striker wins all the points he may have made by that particular stroke, and the marker is obliged to score them.

31. Each party must take care of his own game, and his opponent has no right to answer any questions—such as, "Is the ball in, or out?"—"Do the balls touch?"—and such like. These, and other similar circumstances, the player should discover himself.

32. No person has any right to disclose to the player, by hint or inuendo, the manner in which he should play his ball to the greatest advantage.

33. Neither after a stroke has been played, has any one a right to disclose or comment upon any error the player may have committed; as a stroke of the same kind may occur again in the same game.

34. The striker has a right to demand, that his opponent shall not stand facing him, or near him, so as to annoy or molest him in his stroke; and if his opponent persist in so doing, after being remonstrated with, the aggrieved party is justified in throwing up the game, and such game shall be considered drawn.

35. He who leaves the game before it is finished, and refuses to play it out, loses that game, although he may have made but one stroke; unless he does so for causes mentioned in rule 34.

36. The striker is not entitled to any point, unless one foot, at least, is on the floor while the strike is being made.

37. In playing a four-handed match, whenever the striker makes a hazard, he puts out his opponent—consequently, the opponent's partner takes his place.

38. In playing a four-handed match, if the striker pocket his own ball, or make two misses in succession, his hand is out, and his partner takes his place.

39. In a three-handed game, the players commence by stringing for the lead, and he, who brings his ball nearest to the upper cushion, wins the choice of lead and balls; and he, who brings his ball the next nearest to the cushion, is the player with him; the third player must wait until the first hazard is made, or two misses in succession.

40. In a three-handed game, he who makes sixty-six points first, is out; the other two players continue until the hundred is played out.

41. If the striker should cause his opponents to become sixty-six points each, by a forfeiture, neither of the parties can claim game on the strength of this forfeiture, and can only win it by their next count.

42. The first person who makes sixty-six points ceases all play, and he, whose hand is out, plays on with that player's ball, as that ball is entitled to have its run out.

43. If the player should pocket his own ball, or make a miss, it counts for both his opponents.

44. If a player makes two misses in succession, or pockets his own ball, or causes it to jump off the table—his hand is out.

45. Should a dispute arise between the players, concerning the fairness of the stroke, the marker alone is authorized to decide the question; but if he be incompetent to make the required decision, he should inquire the particulars of the case from the disinterested company present, and, upon demanding silence, should go round the table to each person, separately, and ask, if he understands the game, and the nature of the dispute in question; and the majority of the disinterested company then present, and so interrogated, is to decide the dispute.

46. Should a decision be given contrary to the spirit and intent of these rules, the aggrieved party can notify his opponent of his intention to appeal from it; (this notification, however, must precede the next stroke, otherwise the original decision holds good;) and if, at the conclusion of the game, the party against whom the decision was given, be the loser, and can prove it to have been wrong—he can claim a drawn game, and all stakes depending on such game must be drawn also.

47. Every person should be very attentive, and listen for the stroke before he enters the door of a Billiard Room.

48. The duties of a game-keeper are, to spot the balls when pocketed—to call each count distinctly, and loud enough for the players to hear him—to mark up the numbers made by each player immediately after he gets through his run, and before the next player can commence his stroke—and to see that all but the players stand away from the table, and give them room to pass freely round.

Vocabulary of Terms and Phrases, generally used in the Game of Billiards.—*A Hazard*—Is causing a ball to go into a pocket, or, as it is generally called, "holing" a ball. *Carom*—Is striking two or more balls with your own ball. *Kiss*—When two balls come in contact more than once, or, when the balls, not played with, come in contact. *Scratch*—When a stroke or count is effected by accident—success without design. *Force*—Causing your own ball to recoil after striking another ball. *Own Ball*—The ball with which you play. *Object Ball*—The ball at which you play. *Follow*—Causing your own ball to advance in its onward course, after striking another ball. *Dead Full*—Denotes the contact or concussion of two balls in a straight line, without any divergence from the direct course. *Cut, or Fine Ball*—Denotes that the object ball is hit fine, or barely touched by the circumference of your own. *Miscue*—When the cue slips off the ball—a *faux pas*. *Miss*—When the player's ball misses all the other balls. *Bank*—Causing your ball to strike a cushion, before striking another ball. *Doublet, or Cross*—Making a hazard by first making the ball to be holed rebound from the cushion. *Jump*—Causing your ball to ricochet, or bound on the table. *Jaw*—Where a ball strikes the jaw of a pocket. *Hug*—Where a ball runs close to a cushion, and inclines towards it. *Break*—Position of the balls after a stroke is played. *Foul Shot or Stroke*—When the striker has violated any of the stipulated rules applicable to the game. *Love Game*—Signifies, that one party makes game, before the other party effects a count.

Pool.—A number of small balls, each numbered from one upwards, according to the number of players, are placed in a pocket, and drawn from thence by the marker, and distributed to the players. No. 1 leads the red ball—No. 2 plays at No. 1—No. 3 at No. 2,—the striker always to play with the ball last played at, except when a hazard is made; then the next player leads with the red ball, and he, whose turn is next in order, plays from the string.

1. In Pool, the red ball must first be played, and in leading it, rule 2 must be strictly enjoined, with this exception—if the first lead is not liked by the player, he may always have the privilege of spotting his ball.

2. If the leader follows his ball with either mace or cue, beyond the middle pocket, it is no lead; and if his adversary, or the person next to play, chooses, he may make him lead again, or cause the ball to be placed upon the pool spot, at his option.

3. If a player, in the act of striking, is baffled or impeded in his stroke by his opponent or a spectator, he has a right to re-commence his stroke.

4. If the striker, while in the act of playing, should accidentally touch or move his own ball, without intending at the time to make a stroke, he loses no point; but the opponent may put the ball back in the place where it stood; and if he hole the ball, after it has been replaced, it is good, and the ball so holed shall be marked.

5. Whoever stops or touches a ball when running, either with the instrument with which he plays, or otherwise, it is deemed a foul shot, and the person so touching the balls, before they have done running, loses a mark. This rule must always be enforced.

6. If a ball is made to go extremely near the brink of a pocket, and after sensibly standing still for a longer or shorter time, should fall into it, the striker wins nothing, and the ball must be put on the same brink where it stood, before the adversary makes his next stroke; and if it should fall into the pocket at the instant the striker hath played upon his ball, so as to prevent the success of his stroke, the balls must be replaced in the same position, or as near as possible, and the striker must play again.

7. If any person calls upon another to play out of his turn, the person so calling shall take the mark, and not he who played, and the next in turn must lead.

8. If any person plays out of his turn, unless called upon, he must be marked, unless he holes the ball played at, in which case the ball so holed shall be marked, and the next in turn to the person, who ought to have played, must lead.

9. Any person, whose ball is alive, may take a hazard, and if he misses holing the ball, he must be marked.

10. The person, whose turn it is to play, has the first right to take a hazard, and he must be marked if he does not hole the ball—provided, any person in the pool previously offers to take such hazard.

11. There can be but one privilege, and that must be taken by the first person killed, unless by consent of all the players, that it may remain open; and the person first killed must decide at once whether he will take it, and play in turn.

12. No person can take a ball, if in the room when the balls are drawn, and he neglects to do so in turn, unless said person obtains the consent of all who are playing; and no person in any case can take a ball after the privilege is gone.

13. No person in the pool can have an interest in any other ball than the one which number he draws; nor can that person buy any other ball, or own an interest in any other, so long as his original ball is alive; but when his original number is dead, he may buy that of any other, who may choose to sell, but cannot permit any other person to play it, who may have an interest with him, but he must play it out, unless he sells his whole interest —in which case the person buying, if originally in the pool, shall finish playing out the number. No person, not originally in the pool, can buy in.

14. If a person sells his ball upon the lead, the purchaser must abide by the lead, or may spot the same, as he pleases.

15. If a person makes a lead, he cannot change the same, even if the person next to play sells his ball to a third person after the lead has been made, but he may have the liberty of spotting it.

16. No person can strike twice in succession; and if two are left in the pool, and A strike at the ball and hole himself, B must lead; but should A hole B's ball, then A must lead.

17. When there are but two left in the pool, and one of them wishes to divide or sell, the adversary shall always have the privilege of buying, and if he refuses to give as much as another offers, then his adversary has full right to sell to any one who has been in the pool.

18. If a person playing upon the lead, places his ball out of the string, and is challenged by the previous player, while in the act of striking, the balls must be placed as before, and the stroke made over.

Pin Pool.—As Played in New York.—This game is played by two or more persons in the following manner: There are five small wooden pins set up in the centre of the table, diamond-like,—the one at the apex next the head of the table is No. 1—the one to the right is No. 2—the one to the left is No. 3, and the one next the foot of the tables is No. 4, and the one in the centre is No. 5—and they are placed about two and a half inches apart from one another.

The usual way of designating them is, by marking the numbers on the cloth next to the spots, which each pin occupies, and the rotation of the players is determined by the small numbered balls, as in Two-ball Pool.

After this is determined, each player has another small ball, with a number on it, dealt to him by the game-keeper, and this is termed his private ball

The red ball is then placed on its appropriate spot, about five inches from the lower cushion, midway between the two corner pockets; and he, who has ball No. 1, plays from the string; No. 2 then plays from the string with the other white ball; No. 3 succeeds No. 2, and can play with, or at, any ball on the table.

There are only three balls used in this game—one red, and two white balls. The object of the players is to knock down as many pins as will count thirty-one, by adding the pins so knocked down, and the number on the private ball, together, and he, who first makes thirty-one wins the pool.

For example: If the number on the private ball be ten, it will then be necessary for the player to make the number count twenty-one, by the pins.

In Philadelphia, and many other parts of the United States, four balls

are used, and the game varies in many other respects from the New York game.

The number on the private ball is kept secret from the other players, although a skilful player may form a pretty correct idea of the number of the player's private ball, by the strokes and angles played by the striker.

1. Rules for Pin Pool.—He, who draws No. 1, must play with one of the white balls at the red ball, or place it on the spot used as the deep red spot in the game of Billiards. He, who draws No. 2, must then play with the other white ball, or, if he so choose, can place it on the spot used as the light red spot.

2 No. 1 and No. 2 have the privilege of playing from any part of the string; No. 2 can play on any ball outside the string; and should all the balls happen to be within the string, he may have the red ball placed on its appropriate spot for the purpose of playing on it.

3. The player must first strike a ball with his own ball, before he knocks down the pins, or otherwise it is no count.

4. If a player should first touch a pin with his own ball, and then strike another ball, and that, or his own ball should get pins thereby, he is not entitled to count.

5. After the second stroke is made in the game, the striker has a right to play with or at any ball on the table.

6. Missing or pocketing one's own ball, or another, or jumping one's own, or another ball, off the table, goes for nought—knocking the pins down alone counts.

7. Should a ball be holed, or off the table, it must be placed on the spot used for spotting the red ball at the first stroke, and if that spot be occupied, it is then placed on the deep red spot; and if that also be occupied, it is then to be placed on the light red spot. If the player should make a miss, his ball is to be spotted in the same manner.

8. If the striker should knock down the four outside pins, and leave the centre one (No. 5,) standing, he wins the pool.

9. Sufficient time must be allowed, after the stroke is made, to give the player an opportunity of adding his game up, and to proclaim pool, if he makes it, before the next play, and if he neglects to claim it before such play, he must wait until his own turn to play comes again. And if another makes pool in the mean time, that other is entitled to it, and not he, who first made it.

10. Should a ball rest so as to occupy any of the spots intended for the pins, such pins are to remain off the table, until those spots so occupied become vacant.

11. Should a ball roll against a pin, and cause it to lean over, or knock if off the spot, without such pin falling, the striker cannot claim such pins, as nothing counts but knocking the pins down. But when the pins are knocked two inches from the spots, they are considered down, whether they be up or down.

12. Should a player play out of his turn, he cannot avail himself of any count he may have made by such stroke, and if he gets pins enough to burst him it is his own loss—provided, he was not called on to play; in such case, he cannot suffer by it, and any count effected by such stroke goes for nought. He, whose turn it was to play, when the other was called, or played out of his turn, plays next in order.

13. If the striker knock down more pins than would, by adding such pins to the number on his private ball, count more than thirty-one, he is *burst, i. e., dead;* and if he then wish to take a privilege, he must decide before the next stroke be made, otherwise he cannot take it without consent of all the players.

14. In taking a privilege, the player has a right to draw a new private ball, and of then choosing between that and his original ball; but he must decide quickly, which ball he will keep, before the next stroke be made.

15. New privileges can be taken by players that are burst, as often as there are bursts in the game.

16. Each privilege follows the last number in rotation. For instance: if there are six playing, and one be burst, he succeeds No. 6, and becomes No. 7; if another becomes burst, he succeeds as No. 8; and if it be the highest number that is burst, he plays on immediately after choosing his private ball.

17. If the balls *touch*, or be in contact with one another, the striker has a right to play with either of the balls, so touching, straight at the pins, without striking another ball, and any pins he may knock down, count good, except in such cases as do not conflict with rule 19.

18. Any pin knocked down by jarring the table, blowing upon the ball, or altering or intercepting its course in running, does not count, nor is the player entitled to any pin or pins that may be made by any other ball, though not interfered with during the same play.

19. Should a ball jump off the table, and come in contact with a player, or any other person, and fall back on the table and knock down pins, such pin or pins so knocked down, shall not count, and the ball must be spotted; but if another ball gets pins by the same stroke, the pins so made by that other ball are good.

20. If a player makes pool, and he should at that time have more than one private ball in his possession, he is not entitled to the pool, but is considered burst.

21. The player, in this game, as in Billiards, has the sole right of looking after his own interests, and neither the game-keeper or any of the by-standers have any right to dictate to, or advise him, unless by consent of all the players.

22. The game-keeper is not responsible to the winner of a pool for more than the actual amount of stakes received from the players in such pool.

23. It is the duty of the game-keeper to collect the stakes, and make up the pool—to deal out the small balls to the players—to see that the balls and pins are properly spotted—that there are no more private balls out than there are players in the pool,—and if any such balls are missing, to proclaim its number to the players, as the pool cannot be won by such ball,—to call out each number, in its turn, to players—to proclaim, long enough for them to hear it, the number they may already count from pins knocked down,—and to have all pins properly knocked down, placed to the credit of the respective players, who may have made the stroke.

Bagatelle. "*Vive la Bagatelle!*"—There is little to say about this game except that, in place of Billiards, in a small room it is very amusing. The balls must be played into the holes with much less strength than is used at Billiards. As to the rules of the game they are very simple, and are sufficiently well known to need no recapitulation.

Several games are played on the Bagatelle board—two or more players engaging in them. The most common is called *par excellence* Bagatelle, and is played with nine balls, which are struck with the cue into numbered holes, and the player who makes the greatest score in three "goes up" is the winner.

The French game is generally played a hundred up. The players take it in turn to strike, and count all they make till the striker fails to make a hole. Missing the red ball is a forfeit of one point to the opponent. In some rooms two colored balls are used, each one counting double when lodged in a hole.

In either game, when a ball lies over a hole, but does not drop immediately into it, the opponent may "challenge" the ball, when if, by shaking the board or from any other cause, it drops into the hole, it must be replaced.

The *Canon game*, the *Irish game*, and *Salle Egal*, are varieties of Bagatelle well known to most frequenters of Bagatelle rooms.

In playing at these games it is necessary to deliver the ball with a gentle but firm stroke. Hold the cue lightly between the fingers and thumb, and strike the ball in the centre. A modification of the side-stroke may be well introduced, but the division of the object-ball is most commonly employed in order to make the necessary angles. If you play too hard a ball, you will fail to make the hole you aim at; but at the same time you must be careful to strike with sufficient power to carry the ball beyond the hole in case you miss the stroke.

The prettiest and most scientific strokes at Bagatelle are those made from the cushion to the hole. What Draughts is to Chess, Bagatelle is to Billiards—a simple introduction, though a pleasant and amusing one. For home use a good-sized Bagatelle board is perhaps better than a small Billiard-table. I am told that some players are so well versed in the handling of the cue at this game that they can fill every hole with the nine balls in one trial. I never saw the feat accomplished but once, and then the red ball was lodged in the 8, and the yellow in the 7; these counted double, so that the whole score amounted to sixty; the largest number capable of being got being sixty-four, when one colored ball must be in the centre (9) and the other in the 8 hole.

There is little room at Bagatelle for many of the strokes common at Billiards; but the high, the low, and the "following stroke" will all be found useful occasionally.

Dominoes.—This game is played by two or four persons, with twenty-eight pieces of oblong ivory, plain at the back, but on the face divided by a black line in the middle, and indented with spots, from one to a double six, which pieces are a double-blank, ace-blank, double-ace, deuce-blank, deuce-ace, double-deuce, trois-blank, trois-ace, trois-deuce, double-trois, four-blank, four-ace, four-deuce, four-trois, double-four, five-blank, five-ace, five-deuce, five-trois, five-four, double-five, six-blank, six-ace, six-deuce, six-trois, six-four, six-five, and double-six. Sometimes a double set is played with, of which double twelve is the highest. At the commencement of the game, the dominoes are well mixed, with their faces downwards. Each person draws one, and if four play, those who choose the two highest are partners, against those who draw the two lowest; drawing the latter also serves to determine who is to lay down the first piece, which is reckoned a great advantage. Afterwards each player takes seven pieces at random. The eldest hand having laid down one, the next must pair him at either end of the piece he may choose, according to the number of pips or the blank in the compartment of the piece; but whenever any party cannot match the part, either of the domino last put down, or of that unpaired at the other end of the row, then he says "*go*," and the next is at liberty to play. Thus they play alternately, either until one party has played all his pieces, and thereby won the game, or till the game be *blocked;* that is, when neither party can play by matching the pieces when unpaired at either end, then that party wins who possesses the smallest number of pips on the pieces remaining. In playing this game it is to the advantage of the player to dispossess himself as early as possible of the heavy pieces, such as a double-six, five, four, etc. Sometimes when two persons play, they take each only seven pieces, and agree to *play* or *draw*, that is when one cannot come in or pair the pieces on the board at the end unmatched, he then is to draw from the fourteen pieces in stock till he find one to suit.

Quoits.—An excellent game affording healthy exercise to the players. To play at quoits, an iron pin, called a hob, is driven into the ground to within a few inches of the top, and at the distance of eighteen or twenty yards, as may be agreed upon; a second pin of iron is also fixed. The players are generally divided into parties, and each one pitches a quoit, a round iron ring, from hob to hob; those who pitch the nearest reckoning towards the game. But the determination is discriminately marked; for instance, if a quoit belonging to A lies nearest to the hob, and a quoit be

longing to B lies second, A can claim but one towards the game, though all his other quoits lie nearer to the mark than all the other quoits of B, because one quoit of B being the second nearest to the hob "cuts out," as it is called, all behind it; if no such quoit had interfered, then A would have reckoned all his as one each. Having cast all their quoits, the players walk to the opposite end, and determine the state of the play; then, taking their stand there, throw their quoits back again, and continue to do so alternately as long as the game remains undecided. A quoit that falls with its flat side upwards does not count. The quoit should be delivered from the hand by an upward and forward pitch with a steady aim at the pin, near which it should sink with its sharp edge in the turf. The dress in quoits should be loose and easy, with no restraint from braces.

Cribbage.—A game with cards which is not only amusing, but also reckoned useful to young people, in advancing the science of calculation. It is played with the whole pack of cards, generally by two persons, and sometimes by four. The number of cards forming a hand for this game varies, but is usually either five or six.

Method of Playing.—The progress of the game is marked by a board having sixty-one holes, he who can first succeed in counting these being the victor. The cards are cut for deal, the lowest dealing. Five cards are dealt to each player, out of which two are to be thrown by each player, to form the "crib," which always belongs to the dealer; next, the adversary is to cut the remainder of the pack, and the dealer to turn up and lay upon the crib the uppermost card, for which, if a knave, he is to mark two points. The eldest hand then plays a card, which the other should endeavor to pair, or find one, the pips of which reckoned with the first will make *fifteen;* then the non-dealer must play another card and try to make a pair or fifteen, provided the cards already played have not exceeded that number; and if so he should then endeavor to make *thirty-one,* or the nearest possible number under that. When the party, whose turn it may be to play, cannot produce a card that will make thirty-one, or come under that number, he is then to say "go" to his antagonist, who, thereupon will be entitled to score one, or to play any card or cards he may have in his hand that will make thirty-one or under; if he can make thirty-one he scores two points, but if any number under, only one point. Such cards as remain after this are not to be played, but each party, having during the play scored his points gained, they must proceed to count their hands, the non-dealer first, and the dealer afterwards, who also reckons the crib, and both parties include the turned-up card. The points are counted as follows:—

For every fifteen	2	points.
Pair, or two of a sort . . .	2	"
Pair-royal or three of a sort	6	"
Double pair-royal or four of a sort	12	"
Knave of the turned-up suit	1	"

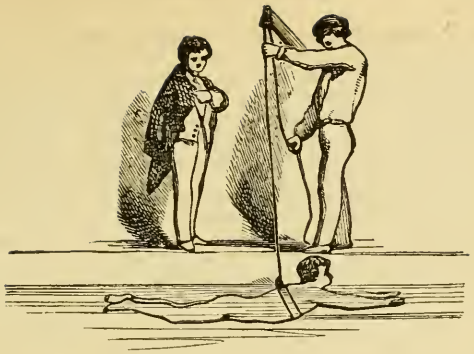
Flush the same number of points as there are cards.

Rule 1.—The opposing parties cut the cards, to determine who shall be the dealer; the lowest card secures it. The ace is the lowest. 2. In dealing, the dealer may discover his own cards, but not those of his adversary —who may mark two, and call a fresh deal. 3. Should too many cards be dealt to either, the non-dealer may score two, and demand another deal, if the error be detected previously to taking up the cards. If he do not wish a new deal, the extra cards must be drawn away. When any player has more than the proper number of cards in his hand, the opponent may score four, and call a new deal. 4. If any player meddle with the pack after

dealing, at the period of cutting it for the turn-up card, then his opponent may score two points. 5. If any player take more than he is entitled to, the other party should not only put him back as many points as are over-scored but likewise take the same extra number for his own game. 6. If any player neglect to count what he is entitled to, the adversary may take the points so omitted. 7. The non-dealer in five-card cribbage, scores three points as an equivalent. 8. Flushes and sequences reckon according to the number of cards forming them.

Maxims for laying out the crib-cards.—In laying out cards for the crib, it is requisite that every player should consider not only his own game, but also that of his adversary, and he should therefore throw out such cards as will leave him a good hand, and embarrass his opponent. When any player possesses a pair-royal, such as three twos, three threes, etc., it is generally advisable to lay out the other cards for crib, unless it belongs to the adversary. A player should generally lay out close cards for his own crib, with the hope of making a sequence, *i. e.*, cards that follow each other consecutively, as one, two, three, four, five, etc. He may also throw out two of a suit, in expectation of a flush; or any that of themselves amount to fifteen, or such as combined with others will make that number, except when the antagonist be nearly home, when it is expedient to keep such cards as will prevent him from gaining at play. A method directly opposed to this, should be pursued in respect to the adversary's crib, which each player should endeavor to baulk, by laying out those cards that are likely to prove to advantage, unless such a stage of the game has arrived, when it is of more consequence to keep in hand cards likely to tell in play, or when the non-dealer would be either out by his hand, or his reason for judging the crib of little moment. *A king is the best card to baulk a crib*, as none can form a sequence beyond it. Low cards are generally the most likely to gain at play; the flushes and sequences, particularly if the latter be flushes as well, are generally eligible hands, as thereby the player will often be enabled either to assist his own crib or to baulk his opponents.

Terms used in cribbage.—Crib: The cards thrown out by each player, which belong to the dealer. *Pairs*: Two similar cards, as two aces, or two kings. *Pairs-royal:* Three similar cards, as three tens, or three knaves. *Double pairs-royal:* Four similar cards, as four fives or four sixes. *Fifteens* are reckoned in a variety of ways and form any number of cards; thus nine and six; four, three, and eight; one, five, seven, and two, or any other combination by which fifteen can possibly be made. *Two for his heels:* Is when the knave of any suit is turned up by the dealer, who thereupon scores two points. *One for his nob:* Is when a hand possesses a knave of the same suit as the turned-up card, and for which one point is scored by the person who holds it.



Mechanical Apparatus for learning to Swim.

ATHLETIC EXERCISES.

Swimming, Gymnastics, Rowing, &c.

Places and Times for Bathing and Swimming.—It is presumed that most young lads who go to bathe will take the opportunity of learning to swim. In crowded cities there are but few places in which the youngster can learn the art; but in the country there are many rivers, ponds, canals, or lakes, where both bathing and swimming may be indulged in without annoyance. The best kind of place for bathing is on a shelving gravelly shore, on which the water gradually deepens, and where no awkward sweep of current may take the bather off his legs. The spot should also be free from holes, weeds, and hard stones; and a muddy bottom is to be avoided by all means. Should the banks of such a spot be shaded by a few trees, and should there be close by an open space for a run on the grass after the bathe, so much the better; and the young learner will then have the chief inducement to venture the sudden dip or headlong plunge.

The best time of the day for bathing or swimming is either before breakfast, between the hours of six and eight in the summer time, or between eleven and twelve o'clock in the forenoon. Delicate persons should not bathe early in the morning; and it would be always well to munch a biscuit before early bathing at all times. No one should ever think of entering the water on a full stomach, or immediately after dinner, and never when overheated and exhausted by fatigue. He should also avoid entering it when cold, or with a headache. Before bathing, it is best to take a moderate walk of about a mile, and, while the system is in a glow, to undress quickly and plunge in. It is bad to walk till you get hot, then to sit down and cool, and afterwards to enter the water; many have lost their lives by this. It is also very wrong to enter the water during rain, as the clothes are often wetted or damp, which gives the bather cold.

Entering the Water.—Having stripped the body, the bather should select the best place on the bank for going down to the stream; and then, proceeding cautiously but quickly, wade up to his breasts, turn his head to the shore, and dip. He then technically, as the boys say, gets his pinch over. Should he not be man enough to proceed in this way, he should, as soon as he gets his feet wet, splash some water over his head, and go into the water more gradually, and try the rapid rush and dip when he gets bolder. He must not attempt to swim or strike out till he can master the feat of going

into the water up to his armpits, and till he feels himself confident and void of timidity.

Aids to Swimming.—Many aids have been used for the benefit of young swimmers: corks and bladders fastened under the arms are the common ones; but they offer dangerous temptations for bathers to go out of their depth, and then should cramp, cold, or any other accident occur, the event may be fatal. Besides, these aids often slip about from one place to the other. We remember an instance, in our younger days, of the "corks" slipping to the hips, and of seeing a young friend, now an old man, suspended in the water with his head downwards; while collapsing of bladders and of air-jackets is by no means uncommon. The best aid to a young swimmer is a judicious friend, himself a good swimmer, who will hold up his head, when he strikes off, by the "tip of the finger to the tip of the chin," and who at the same time will show him how to strike off, and how to manage his hands and feet. It is not a bad plan to put out a spar from a boat, to which a rope is attached, which the young learner may make use of by affixing it to a belt round his body under his arms, which will afford him support while he learns to strike his legs in the water. The rope may also be held in the hand of a friend, by the side of the boat, and the learner may strike off hands and feet as the boat proceeds. The plank is a dangerous aid, from its tendency to slip about, and to take the swimmer out of his depth, and, although it has many advantages, is very unsafe. The safest plan of all is, as we have before stated, for the learner to advance gradually up to his armpits in the water, and then, turning about, to strike slowly out towards the shore, taking care to keep his legs well up from the bottom. Rigid perseverance in this course will in a very short time enable the youngster to feel himself afloat, and moving at "all fours"—a delight equal to that experienced by the child who first feels that he can walk from chair to chair.

Striking Off and Swimming.—In striking off, the learner, having turned himself to the shore, as before recommended, should fall towards the water gently, keeping his head and neck perfectly upright, his breast advancing forward, his chest inflated; then withdrawing the legs from the bottom, and stretching them out, strike the arms forward in unison with the legs. The back can scarcely be too much hollowed, or the head too much thrown back, as those who do otherwise will swim with their feet too near the surface, instead of allowing them to be about a foot-and-a-half deep in the water. The hands should be placed just in front of the breast, the fingers pointing forward and kept close together with the thumbs to the edge of the forefingers; the hands must be made rather concave on the inside, though not so much as to diminish the size. In the stroke of the hands, they should be carried forward to the utmost extent, taking care that they do not touch the surface of the water; they should next be swept to the side, at a distance from, but as low as, the hips; and should then be drawn up again, by bringing the arms towards the side, bending the elbows upwards and the wrists downwards, so as to let the hands hang down while the arms are raising them to the first attitude.

How to Manage the Legs.—The legs, which should be moved alternately with the hands, must be drawn up with the knees inwards, and the soles of the feet inclined outwards; and they should then be thrown backwards, as widely apart from each other as possible. These motions of the hands and legs may be practiced out of the water; and whilst exercising the legs, which can only be done one at a time, the learner may rest one hand on the back of a chair to steady himself, while he moves the opposite leg. When in the water, the learner must take care to draw his breath at the instant that his hands, descending to his hips, cause his head to rise above the surface of the water; and he should exhale his breath at the moment his body is propelled forward through the action of the legs. If he does not attend precisely to these rules, he must invariably have a downward motion, and, as the boys say, swim furthest where it is deepest.

Plunging and Diving.—There are two kinds of plunging: that belonging to shallow, and that belonging to deep water. In shallow-water plunging, the learner should fling himself as far forward as possible into the stream at a very oblique angle; and when he touches the water, he should raise his head, keep his back hollow, and stretch his hands forward. In the deep-water plunge, his body is to descend at a greater angle; his arms are to be stretched out, his hands closed and pointed, and his body bent, so that his nose almost touches his toes.

Diving is one of the greatest amusements connected with swimming. There are many kinds; the two most common and easiest and necessary modes of going below the surface, are—

1. The feet-foremost jump.
2. The head-foremost jump.

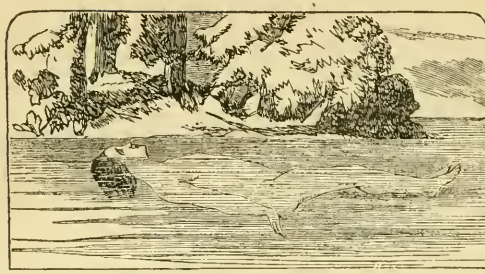
In the first, the legs, arms and head are to be kept perfectly rigid and stiff. The pupil must not allow fear, or the strange sensation felt in the bowels in leaping from considerable heights, to induce him to spread the arms or legs, or to bend his body.

In the second mode, or head-foremost plunge—which is the safest mode for persons who are heavily built about the chest and shoulders, if they have to enter the water from heights—the head is drawn down upon the chest, the arms stretched forward, and hands closed to a point; and as soon as the swimmer feels that he has left the bank, his knees, which till then were bent, are to be stiffened. The diver must avoid striking on the belly—the general consequence of fear; and turning over so as to come down on his back or side—the consequence of pushing with the feet. When he has gone as deep as he wishes, the arms are to be raised and pressed downwards.

Swimming under Water.—When under the water, the swimmer may either move in the usual way, or keep his hands stretched before him, which will enable him to cut the water more easily, and greatly relieve his chest. If he observes that he approaches too near the surface of the water, he must press the palms of his hands upwards. If he wishes to dive to the bottom, he must turn the palms of his hands upwards, striking with them repeatedly and rapidly whilst the feet are reposing; and when he has obtained a perpendicular position, he should stretch out his hands like feelers, and make the usual movement with his feet, then he will descend with great rapidity to the bottom. It is well to accustom the eyes to open themselves under the water, at least in those beds of water that admit the light, as it will enable the swimmer to ascertain the depth of water he is in.

Swimming on the Side.—In this the body is turned either on the left or right side, while the feet perform their usual motions. The *arm from under* the shoulder stretches itself out quickly, at the same time that the feet are striking. The other arm strikes at the same time with the impelling of the feet. The hand of the latter arm begins its stroke on a level with the head. While the hand is again brought forward in a flat position and the feet are contracted, the stretched-out hand is, while working, drawn back towards the breast, but not so much impeling as sustaining. As swimming on the side presents to the water a smaller surface than on the waist, when rapidity is required the former is often preferable to the latter.

Swimming on the Back without Employing the Feet.—This is twofold: 1. *In the direction of the feet.* The body is placed in a horizontal position, the feet are stretched out stiffly, and the heels and toes are kept in contact; then the body is to be somewhat curved at the seat, the hands are to be stretched flatly forward over the body, and, slowly striking in small circles, the loins are somewhat drawn up at each stroke. 2. *In the direction of the head.* The body is placed horizontally, but somewhat curved in the seat, the head in its natural position, the arms are kept close to the body, with the elbows inclined inwards, and the hands describe small circles from

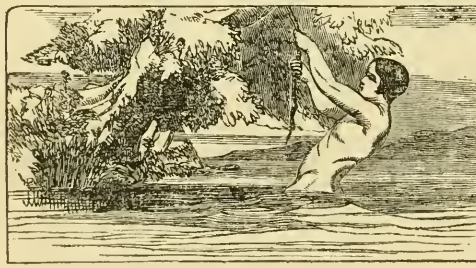


the back to the front, at about a foot-and-half from the hips. These modes serve to exercise and strengthen the arms in an extraordinary degree without in the least fatiguing the breast.

Floating. — The body is laid horizontally on the back, the head is bent backwards as much as possible, the arms are stretched out over the head in the direction of the body, the feet are left to their natural position; if they sink, the loins must be kept as low as possible. In this position, the person, who is specifically lighter than water, remains, and may float at pleasure. The lungs should be kept inflated, that the breast may be distended and the circumference of the body augmented. In order not to sink while in the act of taking breath, which the greater specific weight of the body would effect, the breath must be quickly expelled, and as quickly drawn in again, and then retained as long as possible; for, as the back is in a flat position, the sinking, on account of the resistance of the water, does not take place so rapidly, but the quick respiration will restore the equilibrium before the water reaches the nose.

Treading Water.—This is a perpendicular position of the swimmer, and is of great use to enable him to save a person from drowning. It is in general thought to be extremely difficult, but it is very easy. There are two ways of performing the action: In the first, the hands are compressed against the hips, and the feet describe their usual circle; the other mode consists in not contracting both legs at the same time, but one after the other, so that while the one remains contracted the other describes a circle. In this mode, however, the legs must not be stretched out, but the thighs are placed in a distended position, and curved as if in a half-sitting posture.

The Fling.—The swimmer lays himself flat upon his waist, draws his feet as close as possible under the body, stretches his hands forwards, and with both feet and hands, beating the water violently at the same time, raises himself out of the water. In this manner one may succeed in throwing oneself out of the water as high as the hips. This exercise is very useful, for saving oneself by catching a rope or any other object that hangs from above the surface of the water, or from any perpendicular height.

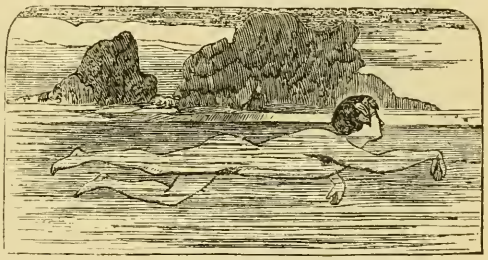


Swimming on the Back. — In this the swimmer turns upon his back in the water by the combined motion of the arm and leg, and extending his body his head being in a line with it, so that the back and upper part of the head may be immersed, while the face and breast are out of the water. The hands should be placed on the thighs straight down, and the legs moved as in forward swimming, taking care that the knees do not rise above the surface in striking them out. Sometimes the hands are used after the motion of a wing or fan, by which a slight progression is also made at the same time that the surface of the body is well lifted out of the water

Thrusting.—In the thrust, the swimmer lies horizontally upon his waist, and makes the common motions in swimming. He then simply stretches one arm forward as in swimming on the side, but remains lying upon the waist, and, in a widely described circle, he carries the other hand, which is working under the breast, towards the hip. As soon as the arm has completed this motion, it is lifted from the water in a stretched position, and thrown forward in the greatest horizontal level, and is then sunk with the hand flat into the water; while the swimmer thus stretches forth the arm, he, with the other hand stretched as wide as possible, describes a small circle in order to sustain the body; after this he brings his hand in a largely described circle rapidly to the hip, lifts the arm out of the water, and *thrusts* it forward. During the describing of the larger circle the feet make their movements. To make the thrust beautifully, a considerable degree of practice is required. This mode of swimming is useful where a great degree of rapidity is required for a short distance.

The Double Thrust.—In the performance of this the arm is thrust forward, backwards, and again forwards without dipping into the water; in the meantime the stretched-forth arm describes two circles before it begins the larger one.

To Swim Like a Dog.—In this motion each hand and foot is used alternately as a dog uses them when swimming, as the term implies. The hands are alternately drawn towards the chin in a compressed form, and then expanded and slightly hollowed, with fingers closed, and as they strike the water the feet are likewise drawn towards the belly, and struck backwards with a kind of kick. This mode of swimming is of use to relieve the swimmer from time to time when going a distance.



The Mill.—The swimmer lays himself on his back and contracts himself so that the knees are brought almost to the chin, and while one of the hands keeps the equilibrium by describing circles, the other continues working. Thus the body is kept turning round more or less rapidly.

The Wheel Backwards and Forwards.—In the *forward wheel* the hands are put as far backwards as possible, and so pressed against the water that the head is impelled under the surface, and the feet, by a pressure of the hands in a contrary direction, are rapidly flung above the head, which in this manner is rapidly brought again to the surface.

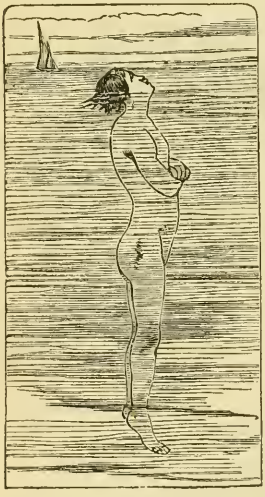
In the *backward wheel* the swimmer lies upon his back, he contracts himself, the hands, stretched forward as far as possible, describe rapidly small circles, the feet rise, and as the point of equilibrium has been brought as near as possible to the feet, the head sinks and the feet are thrown over.

To Swim with One Hand.—The learner to do this swims on one side, keeps his feet somewhat deeply *sunk*, while the arm which in the meantime ought to work is kept quiet—and might be even taken out of the water. It is a good practice of strength to carry, first under and then over the water, a weight of four or eight pounds.

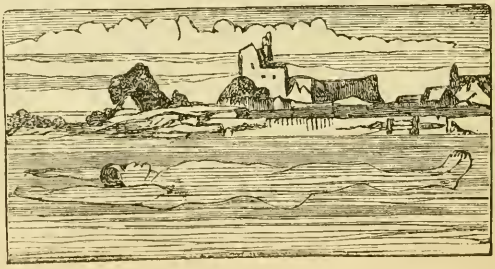
Hand Over Hand Swimming.—In this process, the right hand is lifted out of the water from behind, swung forwards through the air with a kind of circular sweep to the extent of its reach forward, then dropped into the water edgeways, and immediately turned, with the palm a little hollowed, downwards, the body being at the same time thrown a little on one side, and the right leg struck out backwards, to its full extent. The hand descends towards the thigh, and then passes upwards through the water in a

kind of curve towards the surface. The left hand and leg perform a similar movement alternately with the right, and the measure of progression attained by these combined similar movements is very considerable.

Balancing. — When the swimmer has obtained ease and confidence in the water, he will find many things easy which before he deemed impossible. Balancing is one of these. To perform it he has only, when out of his depth, to fall gently back with his chin elevated to a line passing exactly through the centre of his body from the chin to the toes, then folding his arms, and remaining perfectly motionless, he may suspend himself perpendicularly; but if he should extend his arms backwards, and pass them gradually beyond his head, his toes, tips of his knees, abdomen, and part of his chest, with the whole of his face will appear, and he will be balanced and float horizontally without the slightest motion.



The Cramp.—The cramp generally proceeds from acidity of the bowels, arising from a bad state of the stomach, or from the effects of the cold water on the muscular system. Some persons are very subject to it on slight occasions, and such persons will do well never to go out of their depth. But should a tolerable swimmer be seized with the cramp, he should not be frightened, but the moment the cramp is felt in the foot or leg, strike out that foot or leg with the heel elongated, and the toes drawn upwards towards the shin-bone, never minding any little pain it may occasion, as he need not fear breaking a bone, muscle, or tendon. Should this not succeed, he should throw himself on his back, and float quietly, and paddle himself gently to the shore. He may also swim with his hand like a dog, and practise any of the motion of the upper part of the body for keeping his head above water till assistance arrives.



Gymnastics.—A species of exercise tending to develope the frame, and strengthen the muscles, and especially adapted for the human body before it has become "set." The best age to commence the practice of this exercise is about eight years. The practice should be gentle at first, and gradually increase in proportion to age and strength. Gymnastics are better practised before meals than after them, the early part of the day being perhaps the best time of any. Care should be taken not to lie on the damp ground, nor stand in a draught, nor drink cold water immediately after the exercises have been gone through; these exercises consisting of every variety of active employment of the body, including walking, running, jumping, leaping, &c. Of all the corporeal exercises, *jumping* is one of the most useful; to jump with ease and confidence, one should always fall on the toes, taking especial care to bend the knees and the hips; the upper part of the body should be inclined forwards, and the arms extended towards the ground. In jumping we should hold the breath and never alight on the heels. In *leaping*, the object is to pass over an obstacle; in this case, also, the breath should be held, while the hands should be clenched, and the arms pendant. To facilitate this exercise a leaping-stand may be formed. The high leap should be practised, first standing, and then with a short run; in the standing leap the feet must be kept close together; and in the leap with a run, the leaper should take about twelve paces, and go fairly over the cord, without veering to either side, and descend on the ball of the foot. *Vaulting* is performed by springing over some stationary object, such as a gate or bar by the aid of the hands which bear upon it. To perform it, the vaulter may approach the object with a slight run, and placing his hands upon it, heave himself up and throw his legs obliquely over it. The legs should be kept close together; while the body is in suspension over the bar, the right hand supports and guides it, leaving the left hand free. *Climbing the rope.* To do this, cross the feet and hold the rope firmly between them: move the hands one above the other alternately, and draw the feet up between each movement of the hands. In the sailor's manner of climbing, the rope from the hands passes between the thighs, and twists round one leg, just below the knee and over the instep; the other foot then presses upon the rope, and thus an extremely firm support is obtained. In climbing trees both the hands and feet are to be used, but the climber should never forget that it is to the hands that he has to trust. He should carefully look upwards, and select the branches for his hands, and the knobs and other excrescences for his feet; he should also mark the best openings for the advance of his body; he should also be particularly cautious in laying hold of withered branches, or those that have suffered decay at their junction with the trunk. In descending, he should be even more cautious than in ascending, and hold fast by his hands. *In climbing the wooden ladder*, the learner should seize each side of the ladder, and by moving his hands alternately, ascend as far as his strength will permit. He should next try to climb the ladder by the rundles, by bringing the elbow of his lower arm firmly down to the ribs previous to pulling himself up to the other. In performing this exercise the legs must be kept close, and as straight and steady as possible. *Climbing the inclined board.* For this purpose, the board should be about two feet wide, and resting at an angle of thirty degrees. The climber must seize both sides of the board with his hands, and placing his feet flat in the middle, ascend by moving his hands and feet alternately. When the gymnast has, through practice, acquired power and precision to his movements, the plank may be raised until it is almost perpendicular. *Climbing the pole.* The pole should be about four inches in diameter, and firmly fixed in the ground in a perpendicular position. In mounting, the pole is to be grasped firmly with both hands, the right above the left. The legs should alternately grasp the pole in the ascent by means of the great toe, which is turned towards the pole. In descending, the friction is thrown on the inner part of the thighs, and the hands are left comparatively free.

Parallel Bars are two pieces of wood, from six to eight feet in length,

and about four inches square, the edges rounded. For lads they are fixed at about eighteen inches apart, and supported by two round standards, fairly fixed in the ground, from 3 to 4 feet high, according to the stature of the boys. By the aid of these bars several feats may be performed, among which are the following: *Balancing.* Being placed between the bars and in the centre, put your hands right and left on the bars at the same time. After a little jump upwards, preserve your equilibrium on both wrists, the legs close; this is called the first position. Then communicate to your body a gentle movement of balancing from behind, forwards, and continue this several times, the body moving as it were on a pivot. This should be practised until the body swings freely backwards and forwards. *To rise and sink.* Being in equilibrium in the middle of the bars, place the legs backwards, the heels close to the upper part of the thigh. From this position, come gently down, till the elbows nearly meet behind the back, then rise up gently without any impulse or touching the ground with your feet. *To kiss the bar behind the hands.* In the same position as before, bring the body gently down between the bars without touching the ground with your knees; kiss the bar behind each hand alternately, and then rise up in the first position.

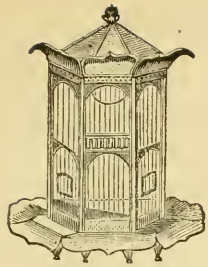
The Horizontal Bar.—In the exercises on the horizontal bar, the first position is assumed by taking hold, with both hands, of the side of the bar towards you, and raising yourself until you can look over it. When you can perform this easily, place the hands on the farther side of the bar, and raise yourself as before. In the next exercise, place your hands on each side of the bar, then raise the body off the ground and endeavor to pass from one end of the bar to the other, by making a succession of small springs with the hands, and afterwards by passing the hands alternately; the legs being, in the meantime, kept close and as straight as possible. *Kicking the bar.* To perform this, hang by the hands and draw up the feet very slowly until the instep touches the pole. This is difficult at first, but is soon learned; do not kick or jerk violently, or you may injure yourself. Next practise hanging by the right arm and right leg, while the left hangs down; then by the right arm and left leg, and left arm and right leg. When perfect in these exercises, take hold of the bar firmly by the right hand, throw the right leg over the bar, hold on steadily by the joint of the knee, and next raise the body and get the left armpit over the bar; then by a little exertion you will be able to assume a riding position on it. *Circling the bar.* In doing this, hang by the hands, and curl the body gently over the bar. If too difficult at first, stop for a minute or two and try something else, and after an interval try it again; it will soon be learned.

The Balancing Bar.—Foremost among the preliminary exercises of balancing are the following: Standing on one leg, holding one foot high in the hand, kissing the toe, and sitting down. The first two explain themselves sufficiently; to kiss the toe, lift one foot with both hands and raise it towards the chin, which should be slightly lowered to meet it; in sitting down, both arms and one leg should be thrust forward, and the other leg bent until the feat is performed; after which he should carefully rise up, keeping his arms and legs outstretched, and steadily preserving his balance all the time. In dry weather, the soles of the shoes should be damped, as then the upper bar is smooth and slippery. Mount the bar either from the ground, or from a riding position on the bar itself; in the latter case, place the right foot on the bar, keeping the heel close to the upper part of the thigh, and allow the left foot only to hang perpendicularly down, with the toes pointing to the ground; then stretch both arms forward, and gradually rise on the foot, keeping your balance for a minute or two before you begin to walk. First, try to walk with assistance, then alone, balancing by extending the arms, and afterwards with the arms folded behind. When you can walk steadily and easily, endeavor to turn round on the bar, first trying at the broad and then at the narrow end, and lastly walk backward. When two persons in walking the bar, wish to pass each other, they should join arms, place their right feet forward, and turn quite round, by each stepping

with the left foot round the right of the other. Other exercises are performed through the medium of the horse, the chair, &c.; and an exercise termed giant strides, consists of a pole set up with four ropes, one of which each pupil grasps, and vaults or steps out in a circle, increasing the velocity by degrees, until at length a complete circle is made in the air without touching the ground with the feet.

Rowing.—In practising this art, it may be laid down, as a general rule, that in calm weather, a light and sharp boat is preferable; and, in rough weather, a heavier and broader one. The learner, however, should not at first begin in too light a boat, nor should he practise in rough weather, until he gets acquainted with its management. To leave the shore, the rower should with the boat hook, push the boat off, head upon tide, or opposite to the current. To leave the stairs, the rower must either push the boat off with the boat-hook, or place the blur of the scull forward and nurse the boat out from the shore. This being done, the rower sits down to his sculls. These he puts in the rowlocks, and turns the concave front of the scull towards the stern of the boat. The rower must sit amidships on thwart or seat of the boat, otherwise she will reel to the side on which he is sitting, and much of his labor will be lost. He should sit with ease to himself, having his feet on the middle of the stretcher, and his legs not quite extended; but his knees, as he rows, should be brought down, and his legs stretched. In grasping the oar for the pull, hold the hand square and firm, but with sufficient freedom to let the muscles of the arm have play. The body is now to be inclined forward from the hips till the head comes nearly over the knees, and the arms extend till the knuckles come over the joints of the instep. The edge of the oar being now turned parallel with the water, so as to feel no resistance from the wind, the dip is made, and at the moment of doing this the oar is dexterously turned so that its edge cuts the water in descending, and being completely immersed and no more, the broad part of the blade is pressed strongly and firmly against the water by the pull. When the pull is fairly and evenly given, and in such a way as that the whole power shall be brought to bear upon the water without any jerking or trembling of the oar, the time is come for lifting it out of the water, and in doing this, the hand or hands are brought close to the side, a little below the chest, the oar is slightly turned or feathered as it rises to the surface, then lifted, and the stroke repeated. In river-rowing, when the tide or current is with the rower, a learner should in general take the middle of the stream. When the tide or current is against the rower, he should take the sides; preferring that side on which, owing to the course of the river, the current is least. In backing water the oars are suddenly turned, the concave parts facing the sculler or rower, who pushes from him. This forces the boat backwards. In turning a boat it is usual to back-water with one oar, or to hold water, at the same time that you pull with the other. If you wish to turn your boat's head to your left side, you pull with the right oar and back with your left, or pull with your left oar and back with your right. In meeting any other craft, the boat which comes with the tide must get out of the way. In this case, both boats, if close, lay the blades of their sculls flat on the water, lift them out of the rowlocks, and let them drift alongside. Each replaces them when the other has passed. In passing a boat, the rower who passes must take the outside, unless there is ample room within; and must also keep clear of the other's sculls or oars. If one boat is crossing the water, and another coming with the tide, the one coming with the tide must keep astern of the other, and have a good look out ahead. In landing, bring your boat in a slanting direction to the landing-place, whether going against or with the current, by which method her stern will slue round, and she will be partly broadside on, with her stern towards the direction of the tide. When you step out of the boat, either use your oar or boat-hook to assist you, unship the sculls, as before directed, lay them in the boat, jump ashore with one end of the painter (or rope by which the boat is made fast) in your hand, and fasten it to the post or ring. *Sea rowing* is

much more difficult than river rowing, and requires more strength and management. One of the most difficult things is launching a boat; in doing this from the sea-beach, when the weather is rough and there is a heavy surf, the two bowmen must get into the boat with their oars run out; and the other rowers follow the boat quickly in the descent; but they should not jump in till she is quite afloat, lest their weight might fix her on the beach, and she might ship a sea. In rowing, each man has in general a single oar, and sits on the opposite side of the galley from the rowlock through which his oar passes. The oar must consequently cross the boat, and be held on its opposite side, so as to clear the back of the man before. The stroke must be longer in sea than in river rowing. The oar must be thrown out with a heave, caused by the simultaneous extension of the body and the arms. It is still more essential to feather in sea than in river rowing. The oar must be drawn back with great power, caused by the simultaneous contraction of the body and the arms; time with the rowers being accurately kept and distinctly marked. When the oars are delivered from the water, the time, until they go into it again, may be counted—one two, three—when they pass through the water. The time is kept by the sternmost man of the rowers. In landing on a sea-beach, the rowers should always look ahead for a proper place, for there are great inequalities in apparently the smoothest beach, and landing in one place may be very good, while in another place, not twenty yards off, it may be dangerous. When a proper place is discovered, the rowers may give "good way" on shore. The bowman should be in the bows, with his boat-hook in one hand and the end of the painter in the other, and immediately the boat grounds, should jump out and haul in. The other portion of the crew should now jump out as quickly as possible, and assist him in pulling the boat up. Then everything should be stowed away safe and secure, and the boat left beyond the reach of the tide at high water. It will always be well to observe the following hints and cautions in rowing:— If you are rowing with others, always keep the stroke. If you are rowing a pair of oars or sculls by yourself, always put both oars into the water at the same time. Keep a good look-out ahead, that you may not fall foul of other craft. Do not put your oar too deep in the water, and mind that the blade of the oar is thoroughly covered. Look well to your thowls, and see that they are not rotten before you place them in the holes. Let your boat-hook lie clear of your oars, and all clear of the painter. See that your foot-boards are properly hitched to the parts of the boat made to receive them. In pushing off a boat from a ship or other craft, be careful not to stand on the seats of the boat, and not to overbalance yourself. Keep your boat neat, trim, and clean, and see that she is well baled out before entering her. Should you be rowing in a boat in which there is a steersman, always be sure to obey orders. If you steer, always bear well forward with each stroke, as it assists the rowers. Keep the rudder ropes as tight as bars, and move the rudder as little as possible.



CAGE BIRDS, TAXIDERMY, &c.

The Canary, Parrot, Goldfinch, Thrush, &c. General Characteristics, Proper Time of Pairing, how to Distinguish the Male Canary from the Female, Diseases of Birds and their Remedies, Taxidermy or Preserving Dead Birds.

Canary.—This well-known cage-bird is never found in this country except in a state of confinement, and it breeds readily in a cage. The best canaries are of a bright yellow with a few jet-black spots. Being originally from a warm climate, they are tender, and must be kept in rooms of an agreeable temperature; if exposed to cold either in rooms or the open air, they pine and die. In dry weather in summer, their cage should be hung in the open air, or at least in the sunshine. If the apartment is kept too hot they will moult at an improper season, and this must be avoided. Only one male should be allowed in a cage. Females for breeding are the better for having a large cage, as it affords them space for exercise. As cleanliness is the most effectual preventive of many diseases to which this bird is subject, the bottom of the cage should be constructed to draw out, and should be cleaned and strewed with sand, at least once a week. The water in the cage must be changed once or even twice a day. The *best food* for the canary is German paste. Crushed hempseed may be given occasionally, but not too often. When the paste is given to them it should be made fresh every other day. When this is not convenient, a substitute may be found by taking the crumbs of stale white bread, and after drying it in an oven, pounding it in a mortar. The powder formed in this manner will keep good for several months, and a teaspoonful may be given every day to each bird, with as much cold or lukewarm milk as will form it into a stiff paste. In summer, green food may be given occasionally, such as lettuce-leaves, turnip-tops, groundsel, and watercress. Cake and other inappropriate delicacies which persons are in the habit of giving to canaries, are very injurious; a bird in full song may be at once rendered mute by partaking of improper food of this sort. The *breeding* of canaries requires additional accommodation. For this purpose a large cage must be provided, and the pair of birds put into it about the middle of April. The female ordinarily lays six eggs, one every day. Each egg should be taken away as laid, and an ivory one substituted; and when the laying is finished, all the six original eggs may be replaced. The period of incubation is thirteen days. When the young are hatched, finely minced egg and bread should be placed near the feeding trough, to enable the parents to carry

suitable food to their young. Canaries will mate with siskins, linnets, several of the finches, and other allied birds, producing, in many instances, highly-esteemed mules. The *diseases* to which canaries are most liable are the surfeit and the yellow scab. When the bird has *the surfeit*, if the feathers of the lower part of the body are blown aside, the body will be found to be swollen, and covered with little red veins. The best remedy is to mix oatmeal with the food for two or three days, and put a little saffron in the water. If the feathers on the head fall off, and any watery eruptions should appear, the head should be washed every day with spring-water, in which a little salt has been dissolved, wiping the head afterwards quite dry, and anointing the skin with palm oil. The bird should be kept warm, and a little ground rice may be given to it, boiled in milk with stick-liquorice. The *yellow scab* which attacks the head and eyes of the canary, may be cured by anointing the part with fresh butter or lard. Canaries often sicken a great deal when they are moulting; at that season they should be kept warm, the cage being set in the sun when it shines powerfully, and the cage being shielded from cold winds. The food should be nourishing, such as Naples biscuits, bread, and the yolks of hard-boiled eggs chopped small. Canaries may be taught to sit upon the hand or the shoulder, and to fly about the room. The mode of teaching requires great patience: At first the cage door is left open when there is no one in the room, and a little hemp seed scattered on the table, the water being left in the cage. The bird will hop out and take the hemp seed, and then return to the cage to drink. The next day the same process is repeated with the owner of the bird in the room. The day following the master or mistress of the bird may be seated at the table; and, finally, the hemp seed may be laid upon the lap, and if the person is kept perfectly motionless, the bird will, in all probability, venture thus far. The same operation repeated for a few days will render the bird less timid, until at length he will perch upon any part of the body even when in motion. Canaries may be also brought to fetch and carry, and to whistle tunes; the latter is taught by playing the tunes over repeatedly on a bird-organ or flute. They will also imitate the singing of the nightingale and other birds, if kept in the same room. Canaries may also be taught to sing at night by keeping the cages covered all day, but in this case the advantage gained is scarcely warranted by the punishment inflicted.

How to Distinguish The Male from the Female.—The male may be distinguished from the female by a streak of bright yellow over the eyes and under the throat; his head is wider and longer, and has richer colors, and larger feet. He also begins to warble first, which is often at a month old.

A Breeding Cage may be made of a double or single form, with the usual conveniences for food and cleaning, and the doors placed where deemed most convenient. The size of the perches should be proportioned to the size of the cage, and they should be placed at intervals most fitting for the birds. In a single cage the top, front, and sides should be of wire, and the back of wood; but if it be a double cage, then both ends of wood. A shelf within a few inches of the top, should be made to project from the back, and a partition run up from the edge of the shelf to the upper wires. On this shelf two square open boxes, about two inches deep, are to be placed for the birds to build in, the entrance into which is from two holes made in the partition. A net-bag, filled with moss, hair, down and feathers, suspended from the roof near the perches, completes the fitting of this habitation.

Within the last few years a great improvement has taken place in the design and construction of fancy bird cages, and a new material is largely employed, consisting principally of zinc, coated with enamel, which excludes all vermin.

The health and happiness of birds depend greatly on *cleanliness:* to promote this, every week, or fortnight at the farthest, the floor and perches of

the aviary or cage should be thoroughly cleansed, and fresh sand strewn on the floor. If this be neglected, not only do the birds suffer in health and spirits generally, but they contract a disease in their feet, frequently resulting in lameness, or the loss of one or more of their claws. A difficulty is sometimes experienced in taming birds to a sufficient degree to set them at liberty from the cage, and allow them to fly about the room. The followineg is the most approved method for accomplishing this;—Cut from the inner plume of the pen-feathers a larger or smaller portion, according to the wildness of the bird; then touch the nostrils of the bird with bergamot, or any other odorous oil, by which it is rendered so stupified for a time as to perch quietly on the finger, or to hop from one finger to another. As soon as it sits quietly on one finger, another finger must be placed in such a position as to cause the bird to step upon it; and so soon as it is accustomed to hop quietly from one finger to another the chief difficulty is overcome; for the bird, gradually arriving to a sense of consciousness, and perceiving that it is not treated roughly, is brought to pay obedience to its master's commands. The *food* of birds should be as near a resemblance of their natural diet as possible. Canaries, bullfinches, goldfinches, linnets, &c., eat seed only. Larks, yellow-hammers, and the various kinds, of tits, eat both seeds and insects. Nightingales, redbreasts, thrushes, blackcaps, &c., eat insects and berries. Wagtails, field-larks, white-tails, &c., eat insects only. To meet this difficulty, all the dead flies found on window-sills and in corners should be collected, and these, added with a few meal-worms, will supply the want specified. Canaries prefer a mixture of canary, summer-rape, and crushed hempseed; goldfinches, poppyseed, now and then mixed with a little crushed hempseed; Linnets and bullfinches, rapeseed alone. Larks prefer barleymeal, mixed with cabbage and water-cress, cut small; chaffinches, rapeseed occasionally mixed with a little hempseed. The various kinds of tits prefer hempseed, oats, and meal. The following are two *receipts for a paste* suitable for birds generally. Thoroughly soak in cold water the crumb part of a stale loaf, press the water out, pour milk over the bread, and mix it with two-thirds of its own weight of barley-meal. Or, grate a carrot, which has been kept in a cool place for a whole year, then thoroughly soak a penny roll in water, strain the water off, and mix the bread and carrot with two handfuls of barley-meal. These pastes, must however, be made every day, as after that time they become sour. All birds need a *fresh supply of water* every evening to quench their thirst, as well as to bathe with; and if a considerable number of birds inhabit the same room, the water should be placed in an earthen vessel, 8 inches long by 2 wide, divided into several compartments. Cage birds are subject to a variety of diseases, foremost amongst which is the *pip*. This disorder is a cold, in which the nostrils are stopped up, and the external skin of the tongue hardened by inflammation. A pill of butter, garlic, and pepper, with occasionally sipping of infusion of speedwell, will soon effect a cure; and, to assist the remedy, a fine feather should be drawn gently through the nostrils. The symptoms of this disorder are a yellowness at the root of the beak, dryness of the tongue, roughness on the feathers of the head, and a frequent gasping as if for breath. *Moulting* may be considered a disease. It is of annual recurrence, and its cure mainly depends on time and attention. During this time the food of the bird should be wholesome and varied; all draughts and cold should be excluded, and the most scrupulous cleanliness observed. *Tympany* is a disease in which the skin of a part, or the whole of the body, is puffed up and tightened by an accumulation of air beneath. The simple remedy is to prick the skin with a needle, and let out the confined air. *Pairing fever* generally attacks cage birds in the month of May. The birds affected cease to sing, allow their feathers to become and continue rough, and waste away. One of the best remedies for this is to hang the cage before a window, by which means the bird becomes cheered and enlivened, and resumes his wonted blithesomeness. *Epilepsy*.—This disease is brought on by a plethoric habit

of body, and results from an excess of food, and a deficiency of exercise. A few drops of olive oil are frequently beneficial, but if this prove inefficacious, dip the bird once or twice in ice-cold water, and cut the claws so closely that they let blood. *Giddiness* is rather the result of bad habit than a disease. It sometimes happens that birds acquire the habit of looking upwards to such an extent, as frequently to turn round backwards on the perch;—the best means of preventing this, is to cover the top of the cage with a cloth, by which the upward look is effectively checked. *Decline.*—The symptoms which betray the presence of this disease are general roughness of the feathers, and an inordinate appetite, coupled with a gradual wasting of the flesh. The most effectual remedy is to force the bird to swallow a spider, and to put a rusty nail into its water, which imparts vigor and strength to the stomach. Green food should be chiefly given during the prevalence of this disease, and more particularly watercress. *Costiveness* may be cured by the administering of a worm bruised with saffron and linseed oil; and *cold* should be treated with a pectoral elixir in an infusion of speedwell.

Parrots.—The following general directions for the treatment, in confinement, of the various species of this gorgeously attired family of birds will be found very useful as the rules on this head which would apply to most other feathered pets are scarcely applicable to them, they being, as it were, a class *sui generis*, with a nature and habits peculiar to themselves.

First, then, let it be observed that they are, with scarcely any exceptions, natives of tropical countries, where vegetation is abundant and the heat intense. God made them with a nature fitted for such climates: they must have fruit, both pulpy, like cherries, grapes, and pears; and hard, like nuts, and the kernels of our native plums, peaches, &c. They must have water to drink and bathe in; as much sunshine as can be given them; and, above all, they must *be kept warm*. The room which they inhabit should always have a fire if the weather is at all chilly; and it is best, at all events in winter, to cover their cages at night with a cap of green baize or flannel. Encourage them to take as much exercise as the limits of their prison will allow: if chained to a perch, which is the best mode of keeping the larger kinds, let their chain be of a good length, and as light as a due regard to strength will allow: it must be of metal, or they will soon sever it with their powerful mandibles. If you can give them an aviary well stocked with orange and myrtle trees, and other plants which are indigenous to warm climates, and supplied in the winter with flues and other contrivances for increasing the temperature, so much the better, as this is the nearest approach to a state of liberty which can be made.

Let all that you do to these birds be done with gentleness and kindness; on no account threaten or attempt to chastise them; gain their confidence, win their affection, and you may do anything with them; frighten them, or arouse their anger, and all your efforts to teach or train them will be unavailing; they will be either shy and timid, or sullen and spiteful; your caresses they will reciprocate, and if you please them will endeavor to please you; and they will also return in kind, as far as they are able, any ill usage to which you may subject them. In this respect bird nature is pretty much like human nature; but there is this difference in the cases; the unfeathered biped, if punished, may be made to understand the reasonableness of it, and be reconciled to the infliction, because salutary, though bitter: the feathered biped cannot. We have dwelt longer upon this part of our subject than may to some seem necessary, but we have done so from a conviction that much suffering has resulted to domesticated birds, and parrots especially, and much annoyance and disappointment to those who have kept them, from want of a due regard to the feelings and predilections of these beautiful and often wayward creatures. Children are frequently suffered to teaze and annoy them, servants to scare and frighten them: tempting morsels are offered to them and withdrawn, to see what

pretty rages they get into, dogs are set to yelp and jump at them, and all sorts of positive cruelties perpetrated, to say nothing of the negative ones of neglecting to minister to their wants and comforts regularly and effectually.

Nothing, perhaps, conduces to the health and vivacity of a parrot more than cleanliness, and yet how often is this grievously neglected to save a little trouble. Not only should this be strictly attended to in the dwelling, but also in the person of the bird. The feet should be carefully washed from impurities, and the plumage occasionally syringed with warm water, if the bathing is neglected, or fails to remove any defilements contracted. All parrot cages should have a grating at the bottom, and a drawer supplied with sifted gravel or very coarse sand, which should be put in fresh every other day. This grating and the perches should be occasionally scraped, and the cage itself thoroughly cleansed about once a month, taking care that it is quite dry before the bird is put into it. The water should be fresh every day, and also the food of a moist nature. And with regard to food, we would fain offer a few remarks supplemental to those included in our accounts of the several species.

Bread and milk is generally the staple prison diet of birds of this kind, and it should be thus prepared : first, cut the bread in slices, and pour over it warm water; let it soak a short time, and then squeeze it as dry as possible ; then allow it to absorb as much fresh boiled milk as it will without being too moist : this kind of soft food should not be exclusively used; an occasional change is necessary, and this may consist, for the larger kinds, of biscuits broken small, farinaceous grain, nuts of any kind, except bitter almonds, and fruit, both hard and soft ; Indian corn is good, but this should be boiled first, drained dry, and suffered to cool. For the smaller kinds, also, a little fruit, with hempseed, canary seed, and millet, &c.

Zinc and pewter food vessels are sometimes used, but these are liable to be acted on by the moist food, especially if at all acidulous, and render that which should be nutritious highly pernicious. Glass and earthenware are the best materials, for obvious reasons. We will now devote a little space to the consideration of the Diseases to which parrots are especially liable :— Irritability, and a desire to pluck out the feathers, is occasioned, as we have already stated, by giving these birds animal food, which should always be carefully avoided ; it is altogether unnatural to them, they being, with two or three exceptions purely frugivorous and granivorous birds. When this mistake is made, and its bad effects follow, apply to the body of the sufferer a lotion made of common salt dissolved in spring water, once a day, and give it nothing but bread and milk to eat for a time. Several internal diseases may be prevented by giving about once a month a few of the pepper pods called chilies, cut into pieces ; these the birds will eagerly swallow, as if they knew they were designed for salutary effect.

Asthma is a disease with which parrots are, perhaps, more frequently attacked than any other bird ; its *causes* are, a cold caught through being allowed to remain in a draught of air, or an undue proportion of hempseed in the food, this being of too heating a nature to be given constantly ; its *symptoms* are, shortness of the breath, and a frequent expansion of the beak when the bird is in any way excited ; its *remedies*—extra warmth, change of food, if that previously given has been chiefly dry, now let it be moist and warm : in severe attacks, give a paste made by boiling a piece of white bread about the size of a walnut, in four tablespoonfuls of milk, stirring with a wooden spoon until it becomes an even pulp ; mix with it a few grains of cayenne pepper, and keep the bird entirely on it for two or three days ; it must be prepared fresh as wanted, as if at all sour, it will prove injurious ; as an aperient, give also about twice a week a small portion of lettuce or water-cress.

Atrophy or Wasting, generally *caused* by the administration of improper food. *Symptoms :* body becomes emaciated ; feathers rough, and disar-

ranged, disgorging of the food : treatment similar to that above recomded, with the addition of a rusty nail put into the water.

Consumption or Decline.—No assignable *cause :* loss of appetite, swelling of the lower parts, and falling away at the breast, are among the *symptoms :* a bread and milk diet, with seed about twice a week ; no water on the seed days ; juice of white turnip to drink, and a chili or black pepper-corn occasionally, are the best remedies ; if taken in good time, this disease can generally be cured, and when not, the patient will often live many years with proper care and attention.

Convulsions, or Fits.—The lories are most subject to these : take the bird up immediately ; open the beak, and put into it a few drops of cold water ; if this does not restore it to consciousness, plunge it suddenly into a cold bath ; this failing, draw out one of the tail-feathers, and lay the patient on some cold substance, such as stone or iron : you have then done all you can for it. If recovery takes place, wrap the bird in flannel, and put it in a warm place until thoroughly dry ; afterwards feed it for some time as directed for asthma ; and give it a few drops of spirits of nitre occasionally in its water.

Costiveness may be detected by frequent and useless efforts of the bird to void its excrements. *Remedies :* a bread and milk diet, with a few shreds of saffron boiled in the milk ; if this is not effective, give about four drops of castor oil, and introduce into the vent the head of a large pin dipped in linseed oil.

Diarrhœa, or Scouring.—The *cause* of this disease is generally some sudden change of diet, or stale or improper food, such as unripe fruit, &c.; the symptoms are frequent evacuations of fluid chalky matter, which adheres to the vent and lower part of the body, and causes great irritation in the parts. *Remedies :* keep the bird unusually warm, feed it with soaked bread and Indian corn boiled in a decoction of lettuce seed ; anoint the irritated parts with palm oil, and give water impregnated with iron to drink, mixed with a small proportion of milk ; chilies are also good in this complaint, and the yolk of hard boiled egg.

Diseased Feet often result from want of attention to cleanliness, and sometimes from what we should be inclined to call gout, or rheumatism, occasioned by cold settling in the extremities. In this state the bird is unable to grasp the perch properly, and becomes restless and uneasy ; it should be at once taken out of the cage and put into a smaller one, where there is no space for climbing ; a tin vessel should be placed at the bottom supplied with luke-warm water for the patient to stand in for about a quarter of an hour, care being taken to keep up the temperature ; when the time has expired, substitute a dry board, and place the cage in a warm situation for the feet to get thoroughly dry ; if any sores are observable, they should be sprinkled over with a little powdered loaf sugar ; the bath should be repeated daily.

Diseased Eyes may proceed from a cold and various causes; when looking sore and inflamed, they should be washed with a warm infusion, made by pouring boiling water over the bruised root of white hellebore ; take care that the bird does not drink any of this, as it is strongly poisonous. When thus affected, a little juice of red beet-root given as a drink is serviceable.

Inflammation.—A sudden change of temperature will not unfrequently cause this disease, which too often results from want of proper care in covering the birds at night ; the symptoms are dullness and inactivity, with a disposition to sleep early in the day, and an appearance of swelling and redness of the veins in the belly. *Remedies,* bread and milk and oatmeal grits well boiled, yolk of egg boiled hard, Indian corn boiled in an infusion of rape-seed about twice a week, especially if the bowels are relaxed; remove all the food at night, and place in its stead a little magnesia mixed with water ; put it in a shallow vessel, as the magnesia sinks to the bottom, and leaves the water clear ; remove this in the morning after the pa-

tient has taken a dose, which he will generally do early, and give the food as above directed.

Moulting with parrots, as with other birds, occurs once a year; the tail and wing feathers are sometimes shed oftener; the moult usually lasts from two to three months, and is often attended with great pain and difficulty. At this time warmth and extra nourishment is indispensable. The following alternation of diet is recommended by one who has had much experience in these matters:—Hempseed, Indian corn, canary-seed, given separately, each twice a week: bread and milk, with a few chilies cut small, and mixed once; on the seed days a little saffron steeped in the water: should the difficulty of shedding the feathers be very great, give captains' biscuit, soaked and made hot with cayenne, about three times a week, and put some stick liquorice in the water. If the moult goes on quite favorably, and the bird appears cheerful, but little alteration from the common diet need be made; warmth is the grand requisite.

Surfeit.—This is usually the effect of stale food, or impure water, want of gravel, or sand, or some neglect of cleanliness; it shows itself in eruptions about the head, which discharge an acrid humor, which, if not washed off, will make the parts over which it flows quite bare of feathers. A solution of common salt in spring water is the best application, wiping the parts perfectly dry after it, and anointing them with palm oil. The diet should be scalded bread and ground rice mixed with milk, in which has been boiled a little stick liquorice. In this case, also, warmth is the one thing needful.

Tumors.—Fleshy excrescences so-called sometimes appear without any assignable cause; they may be removed when they have attained a considerable size, by passing a piece of strong silk round them close down to their junction with the part to which they are attached; tie the silk so that you can gradually tighten it; this do, and the tumor will eventually wither up, and drop off, without giving much pain to the bird.

Vermin.—The best remedy is the white precipitate lotion, recommended for canaries, used with all due caution, on account of its poisonous nature.

Goldfinch.—This bird is attractive from the beauty of its plumage, the sweetness of its song, its great docility, and the readiness with which it breeds with other birds. It may either be kept in the cage or allowed to run about the room. In the former case, an ordinary small sized chaffinch cage is preferable to a bell-shaped one, as the goldfinch is not fond of hopping about the higher perches, and is apt to become dizzy. In the latter case, a place separated from the rest of the room by a grating, or a small tree or bush, should be provided for its sleeping-place. The food of the goldfinch should be chiefly confined to hemp and poppy seed, especially the latter. A little green food should be occasionally given, as lettuce or cabbage-leaves, groundsel, water-cress, &c. The female goldfinch lays once a year five or six pale green eggs, spotted with light red, and often surrounded at the thick end with a circle of small blackish stripes. The males, may at a very early period be distinguished by a narrow white ring round the beak. When taken from the nest, they may be reared on poppy seed, and bread soaked in milk and water. The disease to which the goldfinch is most liable, is epilepsy. Sore and swollen eyes, to which they are also subject, may be cured by an application of unsalted butter. Stupor and giddiness are occasionally produced by the immoderate use of hemp seed, and may be cured by the substitution of soaked lettuce and thistledown. In general, it will conduce to their health, if they be allowed now and then to pull the seeds from a thistle head.

Thrush.—Of this family of birds, the song-thrush is the smallest and most attractive. It is found all over Europe, frequenting woods near streams and meadows, and is naturally somewhat shy and timid. In confinement it may be lodged and treated like the blackbird, though less luxuriously. When wild, it lives on insects and berries; and in the cage, the two com-

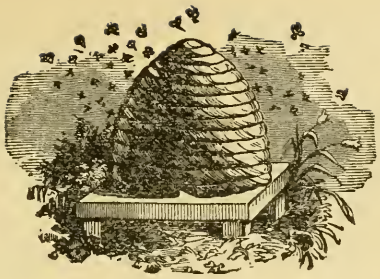
mon pastes, oatmeal moistened with milk or water, or even bran moistened with water, have been found to answer. It requires a great deal of water for bathing and drinking. It is an excellent songster, but does not take kindly to the cage, and is not easily taught any artificial note. The male thrush may be distinguished from the female by a darker back, and a glossier appearance of the feathers. The belly, also, is white. Young birds are hatched about the middle of April, and should be kept very warm. They should be fed with raw meat, cut small, or bread mixed in milk with hempseed well bruised: when they are able to feed themselves give them lean meat, cut small, and mixed with bread or German paste. Keep them in a warm, dry, and sunny situation.

Bullfinch.—When first taken, the bullfinch may be allowed to range the room with other birds, except some particular reason exist why it should be kept in confinement. The shape and size of the cage are of little consequence, as the bullfinch is a quiet bird and thrives under all circumstances. It is, however, usual to put those which have been taught, into a handsome cage of brass wire, and in a room by themselves, as their artificial song might spoil that of other birds, if within hearing. *The food* for those that are allowed to run about, may consist of German paste, and a little rape seed by way of variety. Those which are kept in a cage, however, must have rape and hemp seed, with occasionally a little plain biscuit. Rape seed soaked in water, without any hemp seed, increases their longevity, as the latter is too heating and often ends in causing blindness or inducing decline. They occasionally require a little green food also, such as water-cress or lettuce. The bullfinch is an exceedingly affectionate bird; very averse, both when wild and confined, to being separated from his mate, and when with her, continually caressing and calling to her. They breed three or four times a year. The female lays from two to six eggs of a bluish white, with a circle of violet and brown spots at the large end. The young birds are hatched in a fortnight. If they are to be taught to whistle, they must be taken out of the nest when half fledged, kept very warm, and fed every two hours with rape seed soaked for several hours in cold water, afterwards scalded, strained, bruised, mixed with bread, and softened with milk, of this, two or three mouthfuls must be given at a time. The male bullfinch may be distinguished from the female by a slight red tinge upon the breast They do not begin to whistle till they are able to feed themselves, but must nevertheless be whistled to immediately they are taken, as in this case the lesson is more deeply and readily impressed upon the memory. The bullfinch is one of the few birds that can be induced to learn a tune which may be reduced to the form of musical notation. A great number of them are brought from Germany, where they are instructed to the utmost degree of refinement. To accomplish this, however, the course of instruction must last at least nine months, for, if of less duration, they will either confuse their different airs, learn false notes, transpose passages, or, perhaps, altogether forget their lesson at the first moulting. Even when they have been taught it is as well to keep them apart from other birds, for their aptness at learning renders them liable to catch up any novelty. It is also necessary to help them when they hesitate, and to repeat their song to them especially at moulting time, else there is danger of having an imperfect performer. They are generally capable of retaining in their memory three distinct tunes, and in these they are best instructed by means of a bird-organ or a flute. The utmost perfection, however, is attained by teaching them one air only, together with the usual short flourish or prelude. *Bullfinches* may be *tamed* by the following method:—A fresh caught bird is allowed to feed himself in his cage for one day. A band is then prepared, such as fowlers put round the wings of a decoy bird, with which, and a thread one foot in length, the bullfinch is so fastened that he can neither fall down nor beat himself to death. His food is then put into a little bag, to which is attached a small bell, and his drink poured into a vessel similarly furnished; at first when these are offered

him, the chained bird will neither eat nor drink; it is then as well to leave the vessels with him for a day or two and allow him to help himself, yet approaching whenever he is seen to eat. On the third day he will readily take his food whenever offered, and the bell must be rung as long as he is eating; when he has finished he must be carried about on the hand; upon which, as he finds he cannot get loose, he will at last begin to eat quietly. On the third or fourth day he will probably of his own accord fly to the hand in which the seed bag is, he must then be liberated, and will be found to follow the hand however far it is withdrawn. Should he take the opportunity of flying away, he must again be bound and left without food for several hours. In this manner the bullfinch may be tamed in the course of a few days, and be taught to fly to the hand whenever he hears the bell. The *diseases* by which bullfinches are attacked, are costiveness, diarrhœa, epilepsy, and the moulting disease. On these occasions a change and regulation of food will generally work a cure.

Taxidermy—The art of bird-stuffing, which, in the hands of the naturalist, becomes a very interesting pursuit, and may be readily performed by adhering to the following instructions. In the first place, the manipulator must buy a medical student's dissecting-case, that will contain half-a-dozen knives of the kind he wants, two pairs of sharp pointed scissors, a pair of forceps, and most likely some chain-hooks and a blow-pipe. These last two items he may lay aside; but all the rest are just the things he wants, and buying them second-hand they will cost him no more than a couple of knives and one pair of scissors would if purchased new. He will also require a pair of round and a pair of flat pliers for his wire; a pair of cutting pliers, which, as they are to be used both for wire and for bones, should be pointed ones; a three-cornered file, wire of various sizes, plain and colored glass eyes, some soft thread, some fine twine, tow, cotton-wool, preservation powder, arsenical soap, with brush for laying on the same, and some camphor. For the arsenical soap take—powdered arsenic, 2 ounces; camphor, 5 ounces; white soap, 2 ounces; salt of tartar, 6 drachms; powdered lime, 2 drachms. The soap is to be cut in very thin slices, and put in a crucible with a small quantity of water, over a gentle fire, and frequently stirred with a piece of wood. When properly melted, the lime and salts of tartar must be added; the arsenic is then to be stirred in, and lastly the camphor (reduced to powder with a little spirits of wine) is to be mixed in, off the fire. For the preservative powder take—powdered arsenic, 4 ounces; burnt alum, 4 ounces; tanner's bark, 8 ounces; mix, reduce to powder, and pass through a fine sieve: then add camphor (reduced to powder with spirits of wine), 2 ounces; musk, 30 grains. Both these preparations must be kept in well-closed jars. The soap, when ready for use, should be about the consistence of Devonshire cream. The bird-stuffer should then get the tools and preparations ready, and shoot an old starling (by far the best bird for a beginner). Take a stick of the required size and make two holes with an awl the natural distance apart for the bird's legs; pass the leg-wires through the holes, and twist them firmly round the stick; now fasten the end of the stick firm, either in a vice or nailed to a block; press the legs a little backwards, making the feet the pivot; then put one finger just below the knee-joints on the front of the legs and press the body forwards, making the knees the pivots, until you have the body in a natural position as regards the legs. Now take hold of the body with one hand, and with the other press back the neck-wire to rather more than at right angles with the body; then take the middle of the neck-wire between your fingers, and with the other hand press the free extremity that projects beyond the head, and bend down the head until you have the natural form. To place the wings, supposing the bird to be at rest: cut two pieces of wire two or three inches long or more, according to the size of the bird, and point one end; take the wing in your hand, and pass the pointed end of the wire through the last joint, or rather on the free side of the last joint; now lift the wing with one hand, and, with one finger

of the other, push the first bone, part of which you cut off in skinning the bird, well up under the skin of the back; then bring the wing down to the side, and push the wire firmly into the body. Open the mouth, and take out the wool with which the eye sockets are filled; then stuff the neck, through the mouth, until the proper size; place a little wool in the eye-socket, on the further, upper, and under side. Take with the forceps one of the glass eyes by the little piece of wire which projects from one side, and insert carefully into the socket, making it project rather too much through the lids. Place a little more wool behind the glass eye, and fill up the opening into the eye-sockets and the mouth with it, and tie the beak together. If the eyes now project too much, press them gently back with the finger. Take two little thin strips of wood, drive a strong pin through the centre of one piece nearly to the head; place this under the tail near its base, and pass the point of the pin between the two centre quills; place the centre of the other strip of wood on the point of the pin, and press it down until the tail is held firmly between the two pieces of wood, when you can spread it to the required extent. With a smooth-pointed wire (a knitting-needle will do), arrange every feather in its place, and then wind soft cotton over the whole body to keep the feathers in place, and put the bird in a freely ventilated room to dry. In ducks, hens, &c., the neck is so long and narrow that the skin cannot be drawn over the head with these birds, therefore, skin the neck as high as you can and cut it off; make a cut through the skin from the angle of the jaw to the bottom of the piece of neck still attached to the head, and remove the neck, brain, tongue, &c., through the opening. Most bird-stuffers, and every beginner makes the opening in the neck on the side next the back of the case the bird is to be placed in; but, after very little practice, you may do this so neatly that it is not of much consequence on which side you do it.



BEES.

Their Habits, Management and Treatment.

This adjunct to a farm or cottage is greatly to be recommended, not only on account of the interest attached to it, but also for the profitable produce which it affords from a comparatively trifling outlay, and with little care or trouble.

The person who intends keeping bees should purchase a proper number of hives either at the early or latter part of the year. The hives should be full of combs and well stored with bees. The purchaser should examine the combs, in order to know the age of the hives. The combs of the current season are white, those of the former year are of a darkish yellow; the latter should be rejected, because old hives are most liable to vermin and other accidents. The summer is an improper time for buying bees, because the heat of the weather softens the wax, and thereby renders the combs liable to break, if they are not very well secured. The honey, too, being then thinner than at other times, is more apt to run out of the cells; which is attended with the double disadvantage of the loss of the honey and the daubing of the bees, whereby many of them may be destroyed.

The *aspect* of a hive should be towards the south, and during the winter months the entrance of a hive should never face the sun, as the bees are by that means tempted forth in the morning, and are probably overtaken by the cold and dark, and perish before they can return.

The *situation* of the hive should be in a sheltered part of the garden, protected by a wall or hedge from the cold and biting winds.

The *position* of the hive should be about two feet from the ground, so as to keep out the humidity arising from the earth, and also to guard it against the entrance of toads, mice, and other enemies to the bees. The board on which the hive stands should be nailed firmly to the pedestal in a somewhat slanting direction, to admit of the rain running off.

The *arrangement of the hives* should be in a right line, but if their numbers be too great to admit of this it is more advisable to place them one above another than in double rows. As bees use much water, the hives should be situated in the neighborhood of a stream; but where this is not practicable shallow pans of water should be placed within their reach. The entrance to the hive should be clear, and unobstructed by shrubs or plants, so that the bees upon their return home weary and laden may reach the hive without difficulty.

Cleanliness in bee-keeping is of the utmost importance; the stand upon which the hive is placed should be cleansed about four times a year, the

first cleansing taking place at the commencement of spring. During the winter the snow that has accumulated on the hives should be assiduously brushed away to prevent dampness, which is very injurious to bees. And the entrance of the hive should also be frequently examined in order to remove any damp masses which may have formed to the exclusion of the air.

The *construction* of hives admits of great variety, the most common form is that of a thimble or flower pot in an inverted position The Polish hive, which has many advantages, is made of wood, standing from three feet and a-half to five feet high, and of a conical shape. The size of the hives should be in proportion to the swarm, so that the labors of the bee and the capacity of the combs may correspond. One of the best constructed hives is that known as Payne's Improved Cottage hive.

In the spring, when a hive is well peopled with many thousands of young bees, a particular period arrives when they look out for another asylum than that of their mother. A *swarm*, therefore, is a colony of bees which forsake their native home to establish themselves in another.

The swarms generally appear in the months of May and June, by which time the new hives should be placed to receive them; or where this may have been neglected, a pail, box, or large garden-pot will sometimes act as a substitute in retaining the swarm.

It seldom happens that the first flight of a swarm is to any great distance, but it generally alights on a neighboring bush, and every exertion should be then made to hive it. The best method is to watch the swarm in silence, and when it has collected, an empty hive should be held immediately beneath the bush or branch upon which the bees hang suspended, and which being tapped, with a quick firm stroke, will cause the bees to fall into the new hive. Sometimes the swarm will settle upon the stump of a tree, or other situation similarly inconvenient. In these cases a hive prepared with sugar and beer should be *held over* the crown of the swarm, and gradually and gently lowered until the swarm is secured.

It sometimes happens that a swarm divides itself into different clusters; this is a certain sign that there are several queens, each cluster having one. These clusters should not be molested, but quietly watched until they incorporate, which they will presently do.

When swarms from different hives form a junction, as they sometimes will, it will be prejudicial to the apiarian, and to separate them the following process may be pursued. The swarm being collected into one hive, a sheet must be spread on the ground, the hive must be held over it, and giving it a smart knock the bees will all fall upon it; no fear need be entertained of their flying away, and the queen should be immediately sought.

Having detected a queen in the midst of a group, cover it with a small bell glass, and then proceed to divide the bees as nearly as possible into two equal portions. For this purpose two hives must be in readiness, and having allotted a proper number to the queen, who is at large, the hive should be placed in a remote part of the garden, and as far as possible from the parent hive. The imprisoned queen is then set at liberty and conducted to her hive with that proportion of bees which has been assigned to her. The whole being placed in the hive, it is placed as far as limits will admit in a contrary direction to the former hive. No further fear need be entertained of their adapting themselves to their several homes.

If, on the days immediately succeeding the hiving, the weather be rainy, a little food consisting of a mixture of honey, sugar, and water should be administered to them each night.

When persons are engaged in the operation of swarming, the head and face should be covered, as a safeguard against the stings of the bees; and the clothes should be neither black, brown, blue or any other dark color.

The intention of swarming is betrayed by the bees, for two or three days previously by an extraordinary number of bees hanging in clusters about the entrance of the hive, in an unusual state of commotion, and by an apparent idleness reigning in the hive.

When the swarm is hived, and the bees appear restless and confused, it is a certain sign that the queen is not among them, and the bees will soon return to the parent hive: in this case a queen bee should be taken from the parent hive and introduced among the swarm. The presence of a queen bee may be ascertained by a group of bees being formed around her. After swarming, the hive should not be moved for some hours, in order that stragglers may have time to return to their new home.

The Polish method of making a swarm pass from one hive to another is as follows:—Take both hives in the evening (when all the bees are at home), the full and the empty one, which must be smeared with honey; put the opened bottoms of both hives together in such a manner as to prevent any single bee escaping, smoke the full hive at the top with smoke produced from dry rags, and the bees will speedily remove to the new hive. After that allow the swarm time to settle, and remove them to the stand prepared for them.

The best time for taking the honey from the hives is the month of July, and this is done in two ways, partially and wholly. When a *part* of the honey only is to be taken, the full hive should be inverted and an empty one placed over it, and the two fastened together by a large sheet or table-cloth. The hives being thus arranged, beat the sides gently with a stick, being particular not to strike those parts where the combs are attached. After a few minutes the bees will have ascended into the new hive, and it may then be placed on the pedestal formerly occupied by the old hive. Having extracted the requisite quantity of comb, the hive may be returned to its former position, reversing the hive which contains the bees; and placing the deprivated hive over it, they may be left in that position for four and twenty hours, by which time the bees will be once more in possession of their old habitation. When the honey is to be wholly taken, the bees are suffocated by the introduction of smoke into the hive. The first-mentioned method, however, is not only more humane, but also more in keeping with apiarian economy.

In the early spring and autumn, when there is a scarcity of flowers, bees require *feeding*. The most appropriate food is a syrup composed of sugar, ale, and salt, the proportions being one quart of ale, one pound of sugar, and half an ounce of salt, the whole to be boiled for a quarter of an hour and carefully skimmed. A well-stocked hive will require about one pound of syrup in a fortnight. A plant called the golden rod should be cultivated in the vicinity of the paper, as this begins to blow when other flowers fade, and continues in bloom until the middle of November.

To extract the honey from the comb, three things are necessary, heat, celerity, and cleanliness. Two or three earthen pans with wire frames should be placed in readiness. The hives should then be brought into a warm room, and the combs loosened from the hive with a long thin knife; those parts of the combs that are empty should be cut off first, and those that are black and drossy should be drained by themselves. The pure combs should be cut into small pieces, sliced twice in a horizontal direction and laid on the wire frames to drain; in two or three hours they may be turned; the honey must then be run through horsehair sieves into jars. When the jars are filled they should be fastened down and stored in a dry place.

It is highly important that the apiarian should be made acquainted with the habits and characteristics of the bee tribe, and able to distinguish them by their forms. Bees are divided into three classes—the male bee, or *drone;* the neuter bee, or *worker;* and the female bee, or *queen*. The drone (Fig. 1) is easy to be distinguished from the other bees in the hive by the bulkiness of his body, its obtuse termination, and a thick covering of short pale brown iris about the throat; he is also known by the loud humming noise that he makes in his flight.

The neuter bee, or worker (Fig. 2), is of a nearly black color, and neither so large as the drone or queen. The abdomen is of a conical shape,

and composed of six distinct divisions. The queen bee (Fig. 3) is wholly different in form from the former two, her body is longer and more taper than that of the drone and bee, and she is also distinguished by the extreme shortness of her wings. The breast of the queen is of a golden color, and the upper part of her body is of a brighter hue than that of the common bee.

1 2 3

The management of bees, according to the exigencies of the season, may be gleaned from the following *Monthly Manual*. *October*.—Examine and weigh the hives; and after cleaning the stools, fasten them down for the winter. See that the coverings are clean and weather-tight; and finally remove what combs can be spared. *November*.—Inspect the hives and clean the stools, contract the entrance, and see that the coverings are clean, and the hives so secured as not to be blown off by the wind. *December*.—In very cold and snowy weather close the mouths of the hives as much as possible, and clear away any snow that falls upon the table. *January*.—Towards the latter end give the bees more air. *February*.—Enlarge the entrance of the hive, and in mild weather inspect the hive and clean the stools. This is a good month for purchasing hives. *March*.—Remove all incumbrances from the mouth of the hive, and make every part thoroughly clean. Supply the bees with fresh water. Make an addition to such hives as are strong and heavy, and extract such combs as are old and discolored. Feed weak hives. *April*.—Destroy moths and butterflies. Watch for the signs of swarming; and towards the latter end make artificial swarms, where desirable. Destroy wasps, especially the queens. *May*.—Frequently inspect the hives, and clean away everything offensive. Make preparations for hiving swarms, and keep a good look-out in fine weather. *June*.—Feed new swarms in rainy weather, and enlarge such hives as are numerous and active. *July*.—Remove part of the produce of the bees. Destroy wasps' nests and inspect the hives for vermin. *August*.—Examine and weigh the hives, and take combs from such as exceed 30lbs. *September*.—Transport hives to more abundant pastures. Assist in killing drones. Furnish new coverings when necessary. Inspect the hives, clean the stools, and destroy vermin.

Bee-Flowers.—Conspicuous among all the plants loved by bees (for the best of reasons that they get the most honey or other substances from them), are clover, wild-thyme, heath, and broom, borage, French buckwheat, and *Melilotus leucantha*. This last may be usefully grown for the bees' especial gratifiation. It is easily cultivated, blooms from June to November, and is ornamental, in addition to its other good qualities. But the most important qualification of bee-pasturage is, that there shall be always something for the bees, from the very earliest spring to the very latest autumn. It will be useful, therefore, to append a

List of Bee-Flowers.

Spring.

Erica Carnea*	Almond	Turnip*
Winter aconite*	Wallflower* (single)	Cabbage, &c.
Rosemary*	Borage*	Strawberry

Laurustinus	Onion	Tulip
Hazel*	Gooseberry	Hawthorn
Snow-drop	Apricot	Gorse or furze
Crocus*	Peach	Columbine
Willow*	Apple	Laburnum
Osier*	Gooseberry*	Barberry*
Primrose	Currant*	Ribes Sanguineum
Hepatica	Laurel	Dutch clover*
Violet		

Summer.

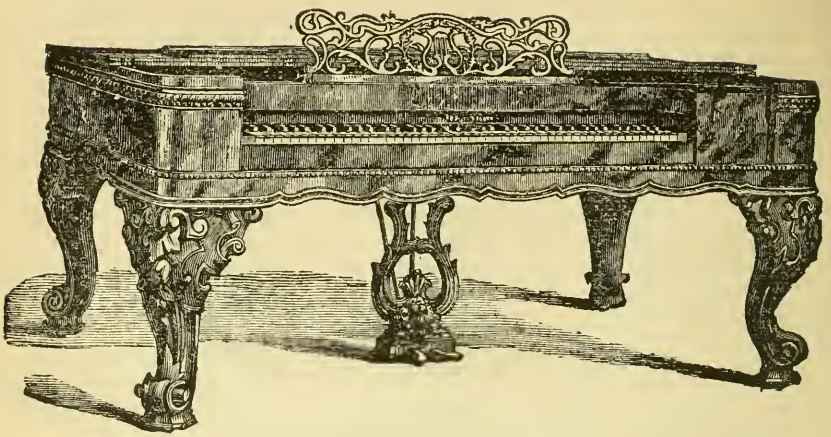
Syringa	Mignionette*	Yellow vetch
Helianthemum	Blackberry	Sainbois
Annual poppy*	Chestnut	Broom
Sea-kale	Mallow	Wheat
French willow	Lime*	Viper's bugloss*
Sweet-briar	Hyssop	Raspberry*
Bean	Teazle	Symphora
Yellow lupin	Nasturtium	Racemosa

Autumn.

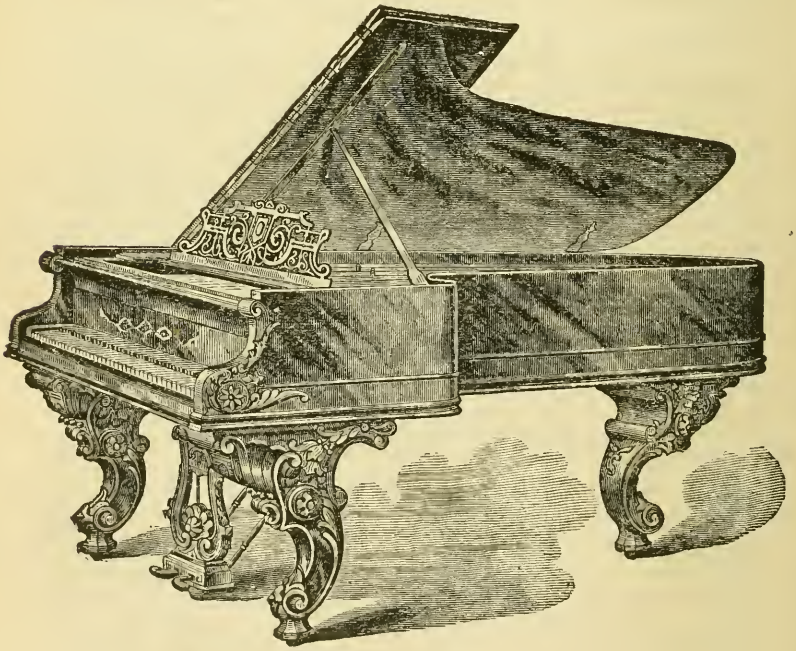
Michaelmas daisy	French buckwheat* sowed at midsummer	Heath*
Winter savory		Sunflower
Purple houseleek		Lemon thyme*
Ivy	Spanish broom*	St. John's wort
Honeysuckle	Hollyhock*	Melilotus leucantha*

Those marked with an asterisk are understood to be the flowers especially favored by the bees. What a choice little garden for himself, as well as for his bees, the apiarian may make from the above list, if he does not choose to leave the bees dependent upon the stores of the neighborhood at large.

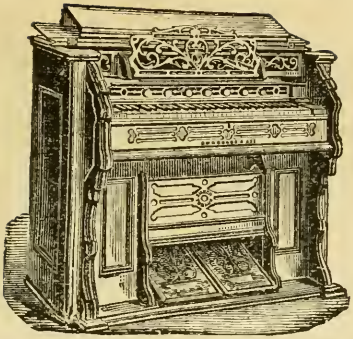
Honey.—The sweet substance elaborated by the bee from the juices of the nectaries of flowers, and deposited in the cells of wax, forming the honeycomb. The nature of honey is very much influenced by the species of flowers from which it is obtained, and the vegetation which supplies the bees with food. The honey afforded by bees that have access to wild-thyme, lavender, rosemary, and some other flowers, abounding in aromatic and essential oils, is of the first quality ; while it is said to be very bad when the bees are located near to fields of buckwheat. The common honey being chiefly derived from agricultural crops or wild plants of the leguminous kind such as clover, beans, gorse, and broom, is, when pure, of excellent quality. New honey appears a uniform transparent syrup, varying considerably in color from nearly white to a yellowish brown, intensely sweet to the taste, but always having more or less of a peculiar flavor and an aromatic odor; and, besides its sweetness, it has a sharp acidulous taste, which becomes sharper with age, at the same time that the color grows deeper. Virgin honey is that which is made in a new clean hive by bees that have never swarmed. In taking honey from the hive, pressure is generally employed, by which a larger quantity of honey is obtained, but at the same time particles of wax, and the intrusion of the bee maggot detoriate its quality and flavor. As an article of food, honey is found to be wholesome, if moderately employed ; but when indulged in freely, it proves to be laxative, and in some habits produces colic. The custom of giving an excess of honey to children is to be particularly discountenanced, as a most injurious practice. As a medicine, honey is employed in the preparation of oxymels and gargles ; it is also employed as a vehicle for administering nauseous and unsightly medicines. In the affections of the throat and lungs, it is frequently found to be remarkably efficacious. If fermentation should take place in honey, it is no longer calculated for ordinary use, and is only fit to be converted into mead or vinegar.



SQUARE PIANO-FORTE.



GRAND PIANO-FORTE.



HARMONY, THOROUGH BASE, TUNING, &c.

THE CHORDS USED IN MUSIC, THEIR PROGRESSIONS AND RESOLUTIONS; PLAYING SACRED MUSIC (OR MUSIC WRITTEN ON FOUR STAVES) FROM A FIGURED BASE; INSTRUCTIONS IN TUNING THE PIANO-FORTE, ORGAN, MELODEON; HOW TO DETECT DEFECTS IN INSTRUMENTS; SELECTING PIANO-FORTES, &C., &C.

Nearly every house throughout the length and breadth of the land contains either an Organ, Melodeon, Seraphine, or Pianoforte, and nearly every person capable of performing on either of the above instruments, has more or less desire to learn to play church or sacred music. An ordinary player can readily play sacred music when written on two staves only, as the different parts are compactly arranged; but the majority of such music is written on four staves, and it is then quite a difficult matter to perform successfully and correctly, unless one has some knowledge of harmony and thorough base.

HARMONY is the law or laws of chord progression; the result of the union of two or more according musical sounds, or an agreeable combination of sounds heard at the same instant.

THOROUGH BASE is the art of constructing musical chords from intervals of the chromatic and diatonic scales, or the art of indicating by figures the other notes of a chord, the BASE note being given.

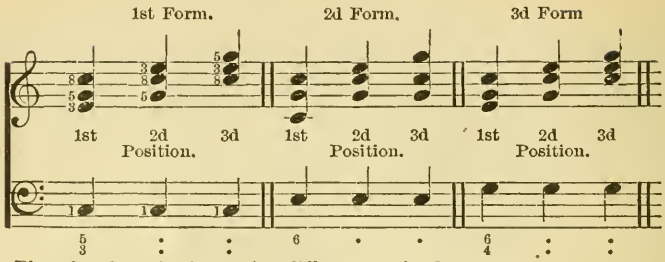
Music written on two staves is styled "Dispersed Harmony," and when written on four staves, "Close Harmony."

By referring to a book of sacred music—as commonly used in choirs—it will be observed that where the music is written on two staves there are no figures under the base, and the eye can easily take the four parts.

It is our purpose to give a concise but comprehensive view of all the principal chords used in music, and with a moderate degree of attention and practice the student will be enabled to play from four staves as easily as from two.

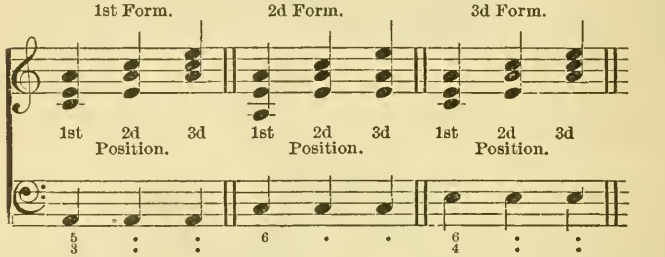
The student is supposed to know the scales.

The Common Chord of C and its three forms.



Play the above in the twelve different major keys.

The Common Chord and its three forms in the relative minor mode.



Play in all the relative minor keys.

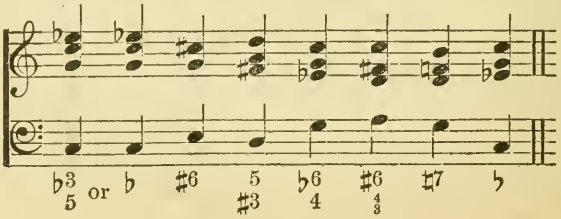
The common chord consists of the first, third and fifth; the eighth is generally added to it. For instance, the common chord of C consists of C (the root or fundamental note), E (the third), G (the fifth), and C (the eighth). The common chord of F consists of F (the root), A (the third), C (the fifth), E (the eighth), &c., &c., &c.

It will be observed that each letter of the common chord has three positions, the first position being when the base and treble are written on the same note; the second when the treble is a third above the base; the third when it is a fifth above the base. The first position is not usually figured. (We have figured as above merely to show the student how it would appear if figured). It is sometimes figured to counteract the effect of a sharp, flat or natural previously introduced.

The treble is always the highest and the base the lowest note.

When the figures 6 or $\frac{6}{3}$ appear, they indicate the common chord in its second form, and in this case the base and treble should be played as written, and the common chord of the *letter a third below the base* note. For instance, if in the key of C: the base note should be E, the student should play the chord of C, taking E as the base.

Example of Accidentals as used with the Figures.



Accidentals (naturals, sharps or flats), when placed under the base, or under the figures, refer to the third in all cases. When placed before a figure they refer to the note or interval indicated by the figures. For instance, in the above example the ♭ before the figure 3 refers to the third of the chord, which is E. The next example has the same effect as the first. The third example: The ♯ before the figure 6 signifies that the sixth interval from the base (which is C) is affected, &c., &c.

When the figures $\frac{6}{4}$ appear, they indicate the common chord in its third form. In this case the base and treble should be played as written, and the common chord of the *letter a fifth below the base* note. For instance, if in the key of C the base note should be G, the student should play the chord of C, taking G as the base.

The figure 6 implies that the root of the chord is found a sixth above the written base; $\frac{6}{4}$ implies that the root is found a fourth above the base, and that the third is found a sixth above the base.

The chord of the seventh consists of the common chord, with the seventh added to it in place of the eighth. C, E, G, B form the chord of the seventh in the key of C. F, A, C, E form the chord of the seventh in the key of F, &c., &c.

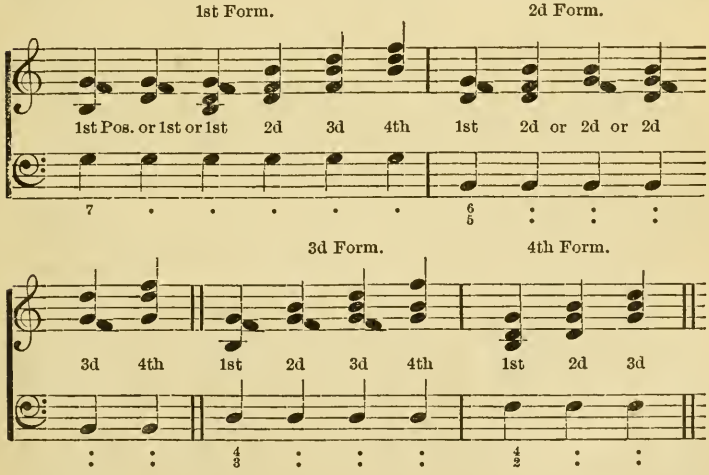
The figures 7, or $\frac{7}{3}$, or $\frac{7}{5}$ are usually applied to it.

This chord has four forms, the first form being figured as above, the second form $\frac{6}{5}$, the third $\frac{4}{3}$, the fourth $\frac{4}{2}$. When this chord is figured $\frac{6}{5}$, play the treble and base as written, adding the other notes pertaining to the chord. Follow the same directions in the chords figured $\frac{4}{3}$ and $\frac{4}{2}$.

It must always be borne in mind in playing from a figured base that the figures under the base indicate intervals from the *base note*, not from the root of the chord.

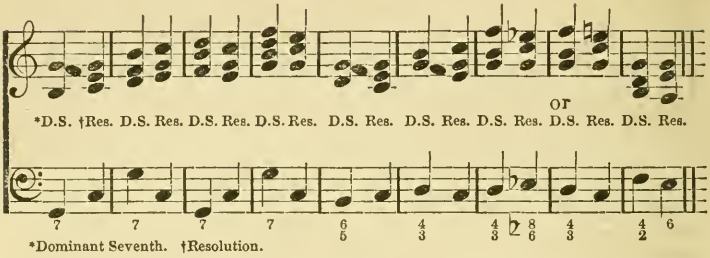
The Chord of the Dominant Seventh.

The fifth of any scale is its dominant. As, for instance, G is the dominant (or root) therefore, of this chord in the key of C. The chord of the dominant seventh is founded on its fifth, and has four forms, as follows:



Every chord has its own resolution, or resolutions. A musical composition founded upon correct resolutions is a progression of harmony; *id est*, one chord resolves on to its successor, etc., etc.

Example of some of the resolutions of the Dominant Seventh.



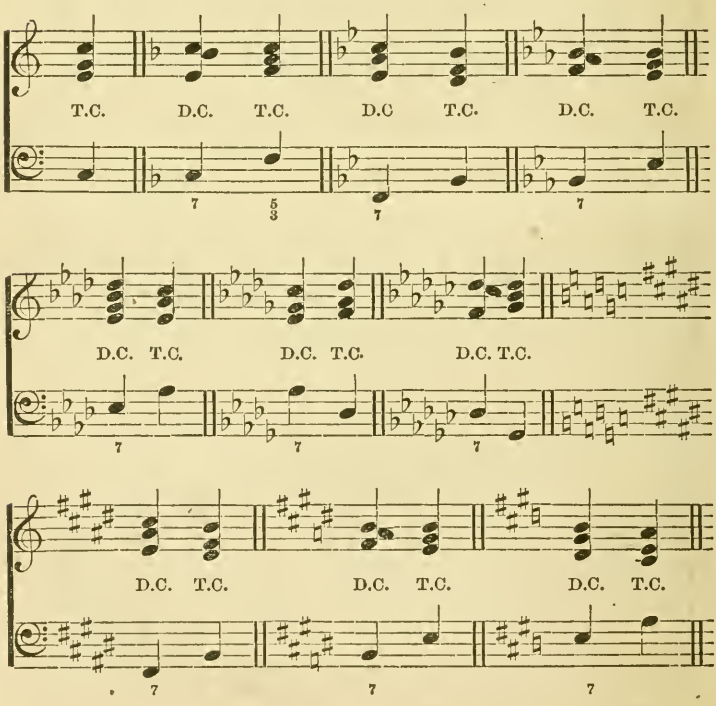
*Dominant Seventh. †Resolution.

The following is the Circle of the Dominant Seventh. Each Dominant Seventh resolves to its Tonic Chord leading through all the Major keys in the following order: C, F, B♭, E♭, A♭, D♭, G♭, B, E, A, D, G.

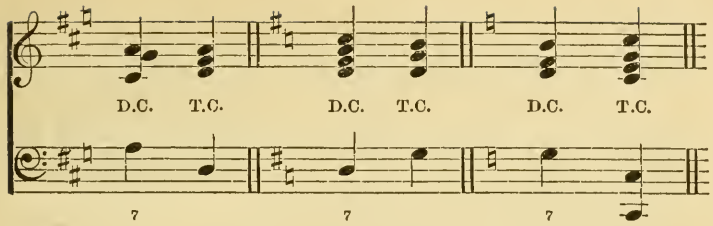
*MODULATION.

CIRCLE OF THE DOMINANT SEVENTH.

N. B. Each Bass note is the *root* of the chord given.



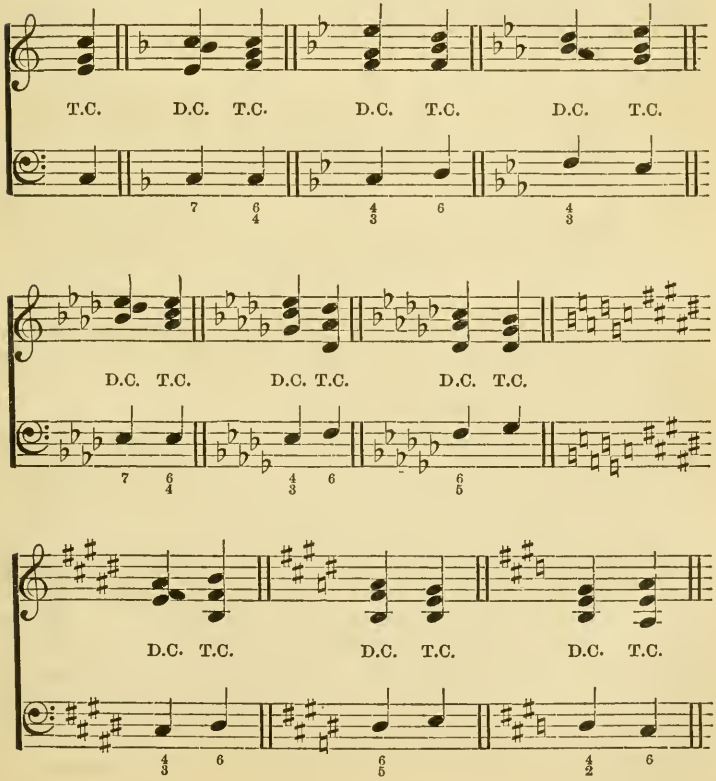
*Modulation is the act of passing from one key into another. See page 406.

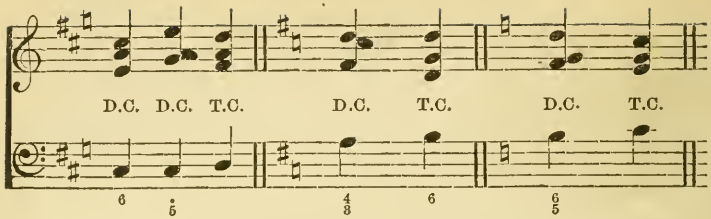


The following is the CIRCLE OF THE DOMINANT SEVENTH, introducing all the forms of the Tonic Chord and Dominant Seventh Chord, *to wit:* Tonic Chord, $\frac{5}{3}$ 6 $\frac{6}{4}$. Dominant Seventh Chord, 7 $\frac{6}{5}$ $\frac{4}{3}$ and $\frac{4}{2}$.

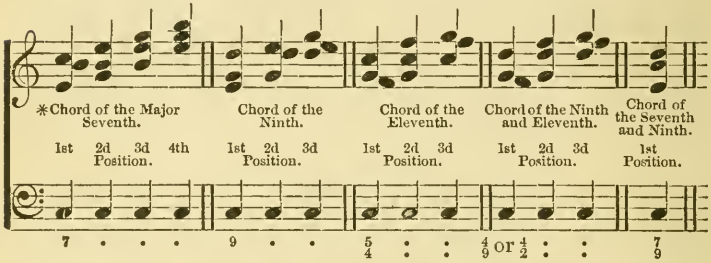
CIRCLE OF THE DOMINANT SEVENTH.

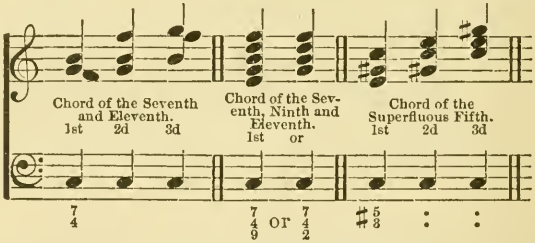
(With all the Forms of the T. C. and D. C.)





The Discordants are eight in number; as follows:



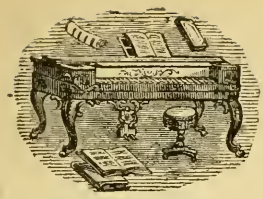


N. B. The figures are not always given in books. With a little experience the student can supply them. The chords are given only in the key of C. They should be learned in all the keys. D. C. stands for Dominant Seventh Chord. T. C. stands for Tonic Chord, which in each case is the Resolution of the Dominant Seventh Chord.

MODULATION.—We have given ample instructions on pages 404, 405 and 406 in this most important branch of the science of music. By playing over the examples given, one can, to a certain extent, appreciate the beauties of MODULATION, and perceive how smoothly and almost imperceptibly the change can be made from one key to another. Hours that otherwise might be tedious can be passed pleasantly in studying modulation. It is a subject that one cannot become tired of.

In studying Thorough Base we would recommend that the student provide himself with a work on sacred music (a note book), such as is generally used in church choirs, select tunes from it that are written on four staves, and practise them over and over, refering to the *base*, *treble*, and *figures* only. Select the plainest and easiest ones at first, you will be surprised at the advancement you will make with study and practise, and how soon you will be able to play from four staves which seems almost an impossibility.

*This chord has four forms, the same as the Dominant Seventh, only one form, 7, is given. $\frac{6}{5}$ $\frac{4}{3}$ & $\frac{4}{2}$ the student will construct.



How to Purchase a Piano-Forte.—Sound seems to be a primitive like gold, silver or any unalloyed metal. The philosopher divides sound into two branches, naming one *noise*, the other *music*. A noisy sound dies on the spot where it is created. A musical sound sets the air vibrating, and *travels* upon the vibrations, *or waves*.

Stand in a thickly crowded and *noisy* street: one can scarcely hear words spoken because of the noise. Yet the *sound* produced by the *noise* of the street does not *travel;* but the *musical* sounds of Trinity Church chimes, produced amidst the *noise* of Broadway, New York, are heard, when the atmosphere is favorable, from three to six miles away therefrom.

The strings of a Cremona violin, when played in the Orchestra, to an ear within three feet of the player seem to be greased and to give forth no sound whatever, while the violin *next* to it sounds loud and full. Go back thirty feet from the players and the *only* instrument the listener will care to hear is the Cremona—clear, liquid, pure, beautiful. He will, as it were *see* the tones like flashes from a diamond on a heap of common paving stones.

The best bird among a hundred canaries is the one whose bill is constantly at work, but whom, when close by, one cannot hear. At the far side of the room the clear, liquid, silvery notes will reach the ear, while those birds that fairly deafen one when close to them are now not heard at all.

Ergo. Buy the piano-forte the notes of which, struck softly, travel the farthest on the waves of the atmosphere. Noisy piano-fortes are just fit for kindling wood and should be sold by the cord.

Great care should be used to deal only with well-known and responsible parties; parties who will be likely to prove *solvent* during the *five* years for which one takes their written guarantee as to durability, workmanship, material, etc., etc.

A light *touch* is not the best in the end. It is too much the habit of unskilful players, because they can execute easily on such a key board, to condemn a piano merely for its heavier touch.

Performers accustomed to a light touch, at times are called upon to assist at concerts, festivals, etc., where a Grand Piano-Forte has been provided specially for the occasion. To such, in such a dilemma, failure is inevitable with its vexation and disgrace. To avoid this, try the *Grands* of the different first-class makers. Notice the strength required to play them and buy a *square* with a similar touch.

Of course all purchasers are likely to desire a good looking instrument. This is a mere matter of money. A lady looks well on the maxim that "fine feathers make fine birds." "Beauty unadorned is adorned the most" will not give one a handsome piano-forte. Styles No. 3 or 4 of most makers, have gew-gaws enough. Nor is it well to purchase a plainer instrument.

Front round corners, serpentine moulding on the plinth, carved Louis XIVth legs, bevelled top. Ivory keys. Pearl are a nuisance.

When purchasing a piano, the object should not be to select the cheapest, but the best; sometimes they may be met with at a comparatively low price in sales by auction. To judge of the power and tone of the instrument requires some practical acquaintance with it; and where this is wanting, the intending purchaser should avail himself of the judgment of a more experienced person than himself. It is common to suppose that any kind of piano, however faulty, will do for learners—the truth being that where the instrument is imperfect the ear of the learner is liable to be deceived and abused; whilst the difficulties of practice are rendered more difficult still, and embarrass the novice instead of lending aid. The preservation of the piano demands that it should be placed in a position where

it will not be subject to the action of either too great heat or cold, either of these acting prejudicially on the instrument. Pianos should be kept shut, to exclude dust and other particles, and should also be locked, to prevent their being injured by servants or children. Striking the keys with immoderate force is, as a matter of course, apt to break them, and besides more noise is thereby produced than harmony. When a piano is to be left untouched for any length of time, it should be enveloped in a cloth or calico covering, to prevent it receiving injuries, either external or internal. Pianos may be hired at so much per month, quarter, or year, either from the dealers or from music warehouses.

To Recover Hammers in Pianos.—Get felt of graduated thickness, cut it in strips the exact width, touch only the two ends with glue, not the part striking the strings. Hold in place with springs of narrow hoop iron.

To Construct an Æolian Harp.—Make a box with the top, bottom, and sides of thin wood, and the ends 1½ inch beech, form it the same length as the width of the window in which it is to be placed. The box should be 3 or 4 inches deep, and 6 or 7 inches wide. In the top of the box, which acts as a sounding-board, make 3 circular holes about 2 inches in diameter, and an equal distance apart. Glue across the sounding board, about 2½ inches from each end, 2 pieces of hard wood ¼ inch thick, and ½ inch high, to serve as bridges. You must now procure from any musical instrument maker twelve steel pegs similar to those of a pianoforte, and 12 small brass pins. Insert them in the following manner into the beech: first commence with a brass pin, then insert a steel peg, and so on, placing them alternately ½ in. apart to the number of twelve. Now for the other end, which you must commence with a steel peg, exactly opposite the brass pin at the other end, then a brass pin, and so on, alternately, to the number of 12; by this arrangement you have a steel peg and a brass pin always opposite each other, which is done so that the pressure of the strings on the instrument shall be uniform. Now string the instrument with 12 first violin strings, making a loop at one end of each string, which put over the brass pins, and wind the other ends round the opposite steel pegs. Tune them in unison, but do not draw them tight. To increase the current of air, a thin board may be placed about 2 inches above the strings, supported at each end by 2 pieces of wood. Place the instrument in a partly opened window, and, to increase the draft, open the opposite door.

To Construct a Metronome.—Take a cheap clock movement and substitute for the pendulum a wire with a sliding weight, marking the wire with a file at the different points of graduation. Used to indicate the proper time in music.

Voice, Management and Preservation of.—*The following hints to vocalists* will be found beneficial:—When about to sing, let the body be in a simple unconstrained posture. Practise two or three times a day, but at first not longer than ten minutes at a time, one of which should be before breakfast. Exercise the extremities of the voice, but do not dwell upon those notes you reach with difficulty. Open the mouth widely at all times, in the higher notes especially; open it to the ears, as if smiling. Never dwell upon consonants. When you are about to sing, read the words, and master their meaning, so as to give them the proper expression. Let every word be heard distinctly: disregard of this rule is a common fault among singers of every kind and degree. Children should never be allowed to sing much, or to strain their voices; the age of fifteen or sixteen is soon enough to begin to practise constantly and steadily the two extremities of the voice. The voice is said to have gained its greatest power at the age of twenty-eight, and to begin to decline soon after forty. Never force the voice in damp weather, or when in the least degree indisposed; persons often sing out of tune at such times, when they do not at others. Take nothing to clear the voice but a glass of cold water, and always avoid pastry, rich cream, coffee, cake, nuts, etc., when you intend to sing.

INSTRUCTIONS FOR TUNING THE PIANO-FORTE, MELODEON, SERAPHINE, AND REED ORGAN.

VIEW OF THE KEY-BOARD OF A SIX-OCTAVE PIANO-FORTE.

TREBLE PART.

BASE PART.

THE ART OF TUNING.—The following practical introduction to the art of tuning the piano-forte will be found of great utility to persons desirous of tuning their own instruments, or who reside in the country far away from the residence of a regular tuner.

The great difference between the sound of a piano-forte when perfectly in tune, as compared with that of the same instrument when *out of tune*, is well known to every player; indeed, at times this difference is so great that one is almost induced to doubt the identity of the instrument.

Every professor, and indeed every piano-forte player, particularly in the country, where regular tuners are not always to be had, ought to be capable of tuning their own piano; and the time and trouble necessary to acquire the power of so doing do not bear any comparison with the convenience and advantages which result.

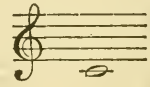
The present work is intended to convey, in the simplest and most intelligible manner, the knowledge, both theoretical and practical, necessary to enable anyone to tune his own instrument. He is merely supposed to known enough of the nature of intervals to understand the meaning of the terms *unison, octave, perfect fifth, major third*, &c.

The system, explained and reduced to practice, is that of *Equal Temperament*, which is now universally adopted.

The intervals chiefly made use of in tuning are the unison, the octave, the fifth, and the major and minor third. Unisons and octaves are always tuned *perfect*, as the ear will not tolerate any modification whatever in these intervals. The fifth, and still more the major and minor thirds, admit of some slight degree of modification in regard to pitch, without losing their consonant nature and becoming offensive to the ear.

THE UNISON.—Square and cabinet, or boudoir, piano-fortes have *two* strings to each note or key; grand pianos, whether horizontal or upright, have three. The pitch of one of these strings is always determined by its being tuned in the relation of an octave or fifth to some previous note; the remaining string or strings belonging to the same note are tuned in *unison* to this first string. Hence the unison, or identical sound, is the interval, if it may be so called, which most frequently occurs in tuning. It is also the easiest interval for the student to begin with.

Supposing the instrument to be in tune, let the student place his tuning hammer upon one of the *pegs*, or *pins*, round which the strings are coiled—say, upon one of the strings belonging to the note

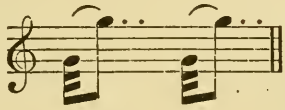


and turn the hammer a little towards the left, so as to relax the string, and thereby depress or flatten its pitch. If we now strike the note C, the collision of the two dissimilar sounds will produce that harsh and jarring effect which we are sensible of when we touch a note that is much out of tune. Let him then turn the hammer to the right, gently and by almost imperceptible degrees; and if he listen attentively, he will observe that, as the pitch of the two strings approaches more and more nearly towards coincidence, he will at first hear a number of strong and rapid pulsations or *beats*, which, as the coincidence becomes greater, will succeed each other more and more slowly, till they degenerate into mere gentle undulations or *waves;* and these, as we proceed, will at length disappear, and give place to one steady, pure, and continuous sound, when the two strings will be perfectly in *unison* to each other. This progression from a mere confused and jarring sound to strong beats, first quicker and then slower, and from these again to smooth and gentle wavings, and, ultimately, to one pure and uninterrupted sound,

must be thoroughly impressed upon the ear and mind of the student; as these gradations are the *mechanical means* upon which the art of tuning depends, and, without a distinct perception of them through their various degrees, it is morally impossible, even with the finest musical ear, to tune a piano-forte tolerably.

The Octave.—When the student is able to tune a perfect unison, he may proceed to the octave. Here the sounds, though no longer identical, have so strong a resemblance to each other, that, when struck together and perfectly in tune, they seem to form but one simple sound—the lower one, as it were, swallowing up the higher. He will observe the same succession and gradation of beats, waves, and ultimate coincidence, as in tuning the unison.

When he has tuned an octave by striking the notes together, let him also try them in quick succession, thus :—

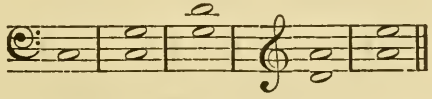


holding the bottom note down; for the ear is apt to be satisfied with the octave while it is yet too flat, particularly in tuning the upper notes of the instrument; and striking them, one after the other, in the above manner, affords a ready and certain means of detecting any error in this respect.

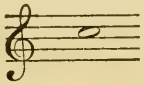
The Fifth and Third.—The student may now practise tuning the fifth, and the major and minor thirds. These concords, when *perfectly in tune*, have neither beat nor wave, but coalesce in one pure, agreeable, uninterrupted, *complex* sound. At first, he will, of course, tune them *perfect;* though we shall presently demonstrate that, according to our present musical system, these intervals are never so tuned in practice. It is necessary, however, that he should be familiar with them in their perfect state, that he may be able to judge of the degree of deviation from this point which the ear will tolerate.

As we can tune only one string at a time, to avoid confusion we must stop the vibration of the other string or strings belonging to the note which we are adjusting. In grand and cabinet pianos, this is done by means of the left hand pedal, which shifts the key-board and the hammers belonging to the keys, so that they strike only one string to each note. In square instruments, however, this must be done by means of a *damper*, which is to be inserted between the string of which we mean to stop the vibration and the string immediately adjacent to it, belonging to the next note; a bit of card, soft paper, or leather, answers very well for this purpose.

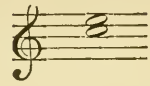
On Temperament.—Experience teaches us, and writers on the mathematical theory of sound demonstrate, that, if we tune the following series of perfect fifths.



the E last obtained will be found too *sharp* to form a *true* major third to the note



the double octave to the C in the base, from which we started. Indeed, the third



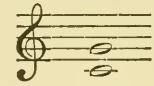
thus obtained is so sharp as to be utterly offensive to the ear, and therefore unfit for harmony, where this interval plays so conspicuous a part.

To remedy this inconvenience, it becomes necessary to tune each of the fifths a very small degree *flatter* than perfect. The E obtained by this means will not be so sharp, as that obtained before; though, if the fifth be properly altered, or *tempered*, as it is termed, it will still be somewhat too *sharp*, as the fifth will not admit of being tuned so flat as to produce a *perfect* major third, without their consonancy being too much affected.

If we continue the above series of *perfect fifths* to B, F♯, C♯, G♯, &c., and compare the notes produced, respectively, with the octaves or double octaves of the notes G, D, A, E, &c., before obtained, we shall find the same defect in all the other major thirds. Hence it appears that, if we tune by *perfect fifths*, all the major thirds will be so sharp as to be unbearable; and that if, by depressing the fifths, we tune our *major thirds perfect*, the fifths will be so flat as to be unfit for the various combinations of harmony.

We must therefore flatten each fifth of the complete circle, C, G, D, A, E, B, F♯, C♯, G♯, or A♭, E♭, B♭, F, C, *equally*, and in a very small degree; this depression, while it will not materially impair the consonancy of the fifths, will produce a series of somewhat sharp, though still agreeable and harmonious major thirds.

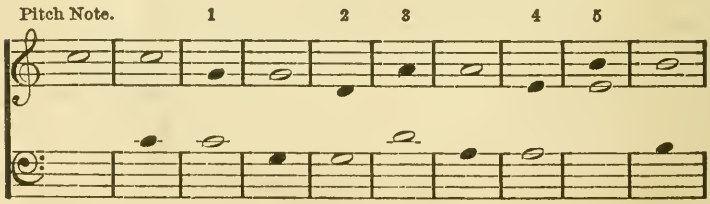
To assist the ear in determining the proper degree of depression, let the student tune the fifth

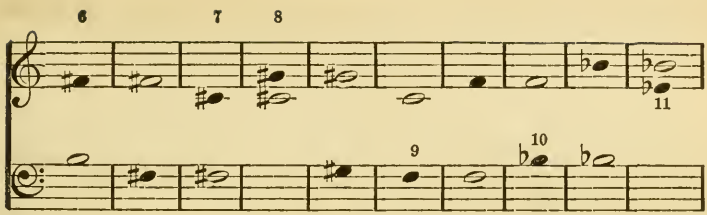


perfect; and then let him flatten the note G, so that, upon striking the notes G and C together, he hears *two slow and distinct waves*, terminating in one steady, continuous sound; and the fifth will be properly *tempered*. The same mechanical *test* will enable him to tune all the remaining fifths of the circle.

By this time the student will have exercised his ear in tuning the principal intervals, and have acquired somewhat of that flexibility of wrist and command of the hammer which enable the hand to move the pegs by almost incredibly minute degrees; he may therefore proceed to learn the following scheme:—

SCALE FOR TUNING ACCORDING TO THE SYSTEM OF EQUAL TEMPERAMENT.

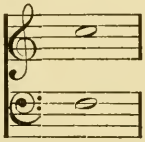




Explanation.—In the above scheme, the first note is tuned to the proper pitch by the help of a C *tuning fork*, which, with the tuning hammer, may be bought at any music store. In the next and each subsequent bar, the black note is used to distinguish the note to be tuned, the white note in the same bar having been tuned already. These black notes always stand in the relation either of an octave or a fifth to the white note in the same bar; and we have already explained that all octaves are to be tuned perfect, and all fifths somewhat flatter than perfect. The octaves tuned after most of the fifths are necessary to confine the circle of fifths to the notes in the middle part of the instrument; as the vibrations of the upper notes are too quick and indistinct, and those of the lower base notes too often mixed with the sympathetic vibrations of other strings, their own harmonics, &c., (particularly when the dampers do not act properly, or when the instrument is old,) to allow of the ear tempering the fifths formed by such notes with sufficient accuracy.

When we arrive at the eighth fifth note of the series, instead of proceeding onwards in the circle to D♯, or E♭, it will be *better* to return to C, and tune the remaining fifths *backwards*, as shown in the scheme. In adjusting these latter fifths, marked 9, 10, 11, the student must first tune the bottom note so as to form a perfect fifth with the upper note, and then *sharpen* it by exactly the same quantity as he depressed the upper notes of the fifths which were tuned *forwards*. By this means, the *interval* of the fifth is still *diminished* or *flattened*, as the lower extremity is brought nearer towards the upper one.

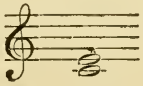
When the last fifth is adjusted, we shall have tuned *every note* within the following compass :—



This operation is called laying the *bearings;* it forms the most delicate and important step in tuning, as all the other notes on the instrument are tuned to these notes by means of octaves above or below.

Generally speaking, it will be found necessary to go over the *bearings* a second time before we proceed to tune the rest of the instrument by octaves to them; trying the different chords, as we proceed, in the following manner :—

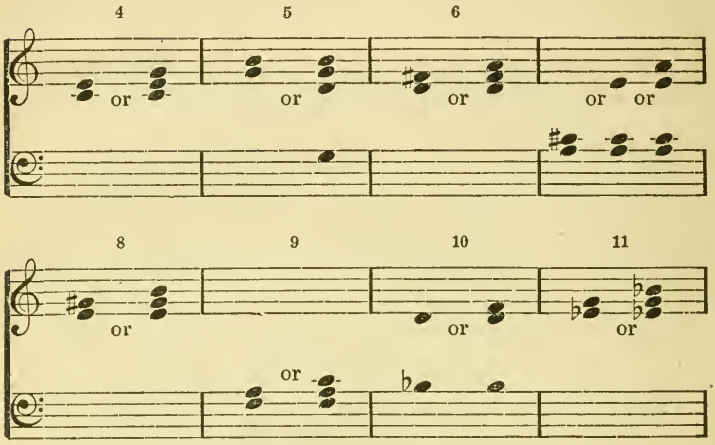
The correctness of the note E, forming the fifth No. 4, must be ascertained by comparing it with the C below it, thus :—



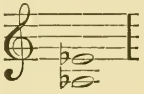
and observing whether, when struck together, these notes produce a major third, somewhat *sharper* than perfect, but still consonant and agreeable. A

similar test must be applied to all the subsequent fifths. These trials may be represented in notes, as follows ; they afford, at each step, a check by which we may ascertain the correctness of our progress :—

TRIALS.

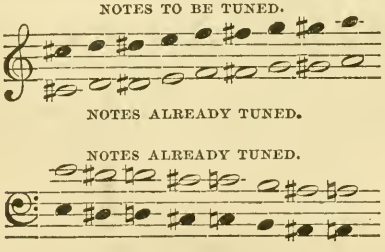


The last and severest test is the following fifth :—



as the two notes of which it is formed have each been obtained by a different series of fifths. Any imperfection which may have escaped us in tuning will manifest itself here ; hence this fifth, from the frequent harshness and howlings of its beats, has been technically termed the *wolf*. If however, the directions which we have given have been carefully observed, this fifth will be little, if at all, inferior to the rest ; and the chords in which one or other of its notes enters will not be less harmonious than the same chords on other notes of the system of sounds.

When the *bearings* are laid with sufficient accuracy, there only remains for us to tune the remaining notes on the instrument in the relation of octaves to those already adjusted. This must be done in the following manner:—



Before we consider the instrument as thoroughly in tune, each upper note should be compared with its octave and double octave below; and, similarly, each bass note with its octave and double octave above: this is one of the surest ways of detecting any inaccuracy in our tuning.

In tuning a cabinet or boudoir piano, it will be desirable to adjust first the whole series of notes upon *one* string, and then to tune all the second strings in unison to those of the first series.

In a grand piano, after the second set of strings is tuned, we must tune the third set in unison to the first and second. In square pianos, the second string to each note must necessarily be tuned before we proceed to another note.

The upper notes must be gone over several times, as the tuning of the bass notes is apt to depress their pitch.

The system which we have explained is that of *equal temperament;* it is that generally adopted throughout Europe. Various systems of *unequal* temperament have been proposed, as those of Kirnberger, Earl Stanhope, &c., in which some of the major thirds or fifths are to be tuned perfect, others modified in various degrees. These have all one capital defect, which is, that while some few keys are tuned more harmoniously than by the system of equal temperament, all the remaining keys are much less perfect; so that it becomes impossible to modulate into them without disgusting the ear.

General Observations.—Let the piano be tuned at least once in two months, keeping it always at concert pitch. If you allow it to go too long without tuning, it becomes flat, and occasions much trouble to get it to stay at concert pitch, especially in the country. There is no greater enemy to a piano-forte than damp. Close the instrument immediately after you practise; by leaving it open, dust fixes on the sound-board, and corrodes the movements; and if in a damp room, the strings must rust. Should the piano-forte stand near or opposite a window, guard, if possible, against its being open, especially on a damp day. When the sun is on the window, close the blinds. Avoid putting metallic or other articles on or in the piano-forte; such things frequently cause unpleasant vibrations, and sometimes injure the instrument. The more equal the temperament of the room, and the less the soft pedal is used, the better the piano will stand in tune.

If a string should break, great care must be taken to replace it by another of *exactly* the same thickness, and of wire of the same kind. A little practise will enable the student to put on a string neatly. New strings require to be drawn up several times, and well rubbed with a piece of soft leather, before they will stand in tune.

Piano-fortes should be carefully guarded against extreme heat or cold, being liable by sudden changes of temperature to be put out of tune. Sometimes, during an intensely cold night, the bass strings will so contract as to rise nearly a tone above the pitch. When thus affected they should not be touched, as the return of the temperature will bring them into tune again.

It is advisable not to place them against outer walls, which being more or less affected by the state of the atmosphere, naturally communicate such effects to adjacent objects.

The same circumstances produce opposite effects on different kinds of instruments. Flutes and other wind instruments are usually tuned a little too flat, because the warmth imparted to them by the breath and hands in playing upon them causes them to rise a little in pitch.

In tuning the violoncello, it is best to commence with the second string, as we do on the violin, by which means we are less liable to error; and if we take the pitch from the organ or piano-forte, the whole of the instruments in an orchestra are tuned with more ease and certainty from the chord of D minor than from any other note or chord. As the German flute plays mostly in altissimo, that instrument is more accurately adjusted to the orchestras by tuning to the highest D.

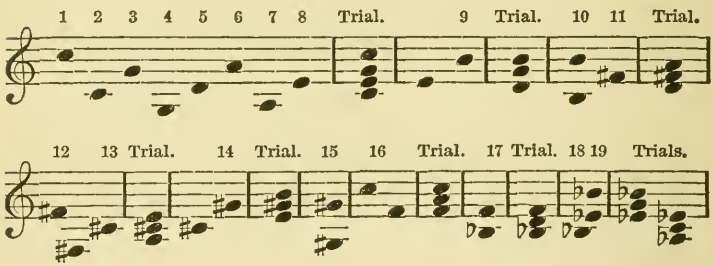
VARIOUS EXERCISES AND EXAMPLES IN TUNING THE PIANO-FORTE.

(The following examples are to be regarded as scientific experiments, rather than a system or method for general use in tuning.)

Several systems of tuning have been successfully employed since the invention of piano-fortes. the following method, No. 1, seems to give the most general satisfaction. The mode of tuning by occasional fourths may suit some tuners of long practice, but learners will never tune by fourths so soon as by fifths or thirds, because a fourth does not strike an unpractised ear so well as a third or fifth. The principal reason given for the system of fourths is, that the bearings are brought within a smaller compass than by the usual method. If that is the only principle on which it is defended, Nos. 2 or 3 are more likely to obtain a preference, as they are both within an octave, and are tuned by major thirds and perfect fifths.

If the exact number of beats in a wire could be ascertained, a mathematical division of the temperament would be no difficult operation; but as no two wires have an exact similitude of vibration, the precise temperament required in each piano must be subject to the ear of an experienced tuner. The following examples will materially assist the learner, particularly when the chords are well examined in their respective places.

No. 1.



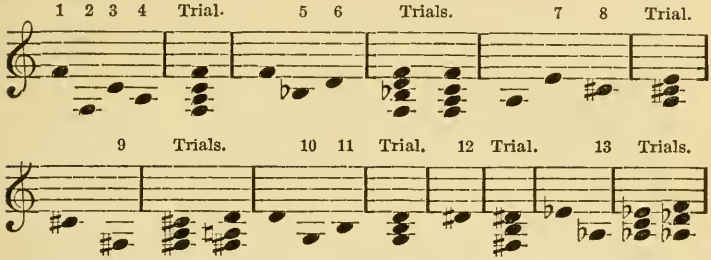
Begin tuning with pitch C; from C descend to the octave. Then ascend to G, tuned flat, descend to G. Ascend to D, tuned flat, ascend to A, tuned flat; descend to A; ascend to E, tuned flat. Now try the chord of C, E, G. Then proceed to B above, which is tuned less flat than the preceeding fifths. Try the chord of D, G, B. Descend to B, ascend to F sharp, tuned flat. Try the chord D, F sharp, A; descend to F sharp; ascend to C sharp, tuned flat. Try the chord A, C sharp, E. Ascend to G sharp, tuned perfect. Try the chord E, G sharp, B. Descend to G sharp. Now return from pitch C to F descending, tuned sharp. Try the chord F, A, C. Descend to B flat, tuned sharp. Try the chord B flat, D, F; ascend to B flat; descend to E flat. Try the chords of E flat; G, B flat, and A flat below C, E flat. If properly tuned, the E flat will be a good fifth to B flat above, and to A flat below.

The fifths, in beginning, are tuned less flat than they were formerly, as the modern temperament is more equal in fifths than according to the old method, which was that employed in most organs; according to which system, the keys most used are more harmonious, while the extreme keys, not so frequently played in, are intolerable. A good tuner can accommodate the temperament to the taste of those who play in particular keys, which they wish to be more perfect than the rest.

When the bearings are tuned, descend by octaves. Then tune the treble also by octaves. When the piano is very flat, tune the treble sharper than

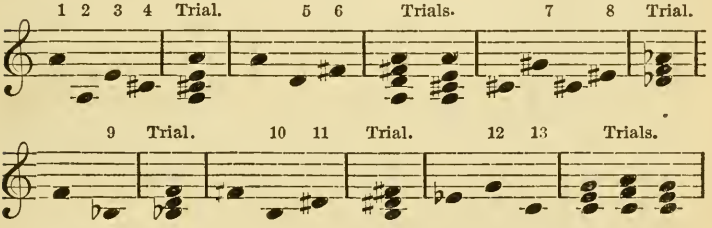
requisite, as it is sure to fall the first time it is drawn up. Most pianos fall from E, F, or G, below pitch C, to the upper part of the instrument.

No. 2.



Tune from F to F below; then to C, tuned flat; then A, tuned sharp. Try the chord F, A, C, F; then from F to B flat, tuned rather sharp; then D, tuned sharp; then two trials of chords F, B flat, D, F, and F, A, C, F; then from A to E, tuned flat; then from A to C sharp, tuned sharp; then try the chord A, C sharp, E; then C sharp, F sharp, tuned sharp; then two trials of chords F sharp, A sharp, C sharp, and F sharp, A, D; then from D to G tuned sharp; then to B tuned sharp; then try the chord of G, B, D; then from B to D sharp, tuned sharp; then try the chord F sharp, B, D sharp; then from E flat to A flat, tuned perfect. Then try the chords A flat, C, E flat, and A flat, D flat, F.

No. 3.



Tune from A to A below; then to E, tuned flat; then from A to C sharp, tuned sharp; then from A to D, and from D to F sharp, tuned sharp; then try the chords A, D, F sharp, A, and the preceding chord; then from C sharp to G sharp, tuned perfect; then from C sharp to E sharp, or F, tuned sharp; then try the chord D flat, F, A flat; then from F to B flat, tuned rather sharp; then try the chord B flat, D, F; then return from F sharp, B, tuned sharp; then to D sharp, tuned sharp; then from E flat to G, tuned sharp; then to C, tuned sharp; then try the chords C, E, G, and C, F, A.

CAUSES OF DEFECTS IN PIANOS, WITH THEIR REMEDIES.

Keys Sticking.

When a pin is too tight in the mortise, file it.

When a hopper spring is too strong, weaken it.

When the hopper is rough in the part that touches the under hammer, sandpaper it and blacklead it.

When one key sticks to another, consider whether the pins are in a proper position; if so, plane a little off the key or keys: or if the key is considerably warped, bend it back with a warm iron; press it very gently, for fear of the mortise, where the key is weak.

When touching the front slip; which, in that case must be reduced in thickness.

When a pin, needle, or any other detached substance, is between two keys.

When a key touches the cheeks of the key frame.

When it touches the cheeks of the case.

When it touches the pillars of the hammer rail.

When any glutinous substance is under it, or betwixt two keys.

When the leather on the under hammer is rough or too loose.

When the key is too light behind the balance rail.

To open the mortises or pin holes, a very fine key file must be used—a flat one for the square hole, and a round or rat-tail file for the round hole, under the key. They must be used very carefully. A key is frequently spoiled by injudicious management; for if the pin holes are too large a rattling will certainly ensue. Most persons, ignorant of the whole apparatus of the key, immediately proceed to widen the holes, without examining whether the defect is not elsewhere. The key must be taken out with caution; draw the front block or blade of the hopper forward with your finger, to prevent its touching the under hammer, while with your other hand you gently lift up the key and pull it out. The same care is requisite in replacing it.

The Keys Rattling, Clicking, &c.

When the pin holes are too large you must wedge the key on each side of the mortises; when all the keys rattle from that defect, it is sometimes better to introduce thicker pins.

By friction of one key against another. This is remedied as explained in the last page.

By friction of the key against the front slip. This defect is likewise provided for in the last page.

The friction caused by a key against one of the pillars that support the hammer rail. Remedy it as on the other side.

When the cloth or baize under the key is not sufficiently soft; or when some hard, detached substance lies between the key and the cloth or baize.

When the key touches the balance rail, file it underneath.

When the ivory or ebony is loose, reglue it.

When the lead is loose, hammer it till firm.

When the key is unsound, glue it.

When the front block or bracket is loose, glue it.

When the key frame is not firmly attached to the bottom, first examine the screws; if they are tight, glue some brown paper betwixt the rail and bottom where the vacancy occurs. If the screws do not hold, introduce larger ones.

When a loose splinter is in the pin hole.

When a pin is rough, file it at or near the head.

When the metal of a pin has communicated itself to the hole, which has become too hard, file it.

When the further end of the key touches two damper levers.

When a key touches a cheek of the hammer rail.

When a key touches a cheek of the case.

When the key touches the name board, the latter should have cloth under it.

When the leather at the further end of the key is too hard, it rattles against the damper lever.

When the ivory or ebony touches that of the next key, file it as smoothly as possible.

When the further end of the ebony touches the front of the name board, saw or file it off as carefully as possible.

When a key touches any hard substance at the further end, near the damper lever.

When any hard, detached substance is on a key.

When a hopper or hopper guard is loose.

Noise in the Hoppers

Is caused by the friction of the spring against the groove.

By looseness of the spring.

By looseness of the hinge.

By looseness of the check.

By looseness of the tenon.

By looseness or unsoundness in the blocks.

By roughness of that part which touches the under hammer.

By touching the next hammer.

By a sudden blow against a hard under hammer.

By touching the next hopper.

When the cloth is too hard.

When the pin is loose.

Noise in the Upper Hammers

Is caused by looseness or unsoundness of the hinges.

By hardness of the leather under the block.

By some detached, hard substance betwixt, upon, or under the hammer.

By looseness or unsoundness of the head.

By friction of the head against the damper socket.

By unsoundness of the shank.

By the friction of loose glue against the hammer rail, near the hinge.

By looseness or unsoundness of the block.

By looseness of the leather under the block.

By the friction of one shank against another.

When the upper coat of the hammer is too hard, if there is sufficient substance, prick it with a marking awl; if there is no substance in the leather, it must be replaced.

When a hammer in the box action touches the long block or the belly.

A Rattling or Noise in the Under Hammers

Mostly proceeds from the same causes as in the upper hammers.

To take off a hammer the slip must be first unscrewed.

To detach and replace the under hammer rail requires great caution.

Noise in the Dampers

Happens when the socket hole is not well lined, or through hardness of the cloth. To remedy this, prick the cloth with a marking awl, or unscrew the damper, and line the socket hole with other cloth, having taken out the old. Paste, gum, or thin glue will fasten it.

When the damper wire is loose in the head, plug up the hole and bore a fresh one.

When the damper wire is too close to the string. To remedy this requires much care in bending the wire, or in loosening the cloth from the socket hole on that side of the damper wire that touches the string. It sometimes happens that the string must be removed from the damper wire, by bending the bridge pins. This last alternative must be avoided, if possible.

When the damper wire is loose in the button, or detached from it. If the wire will not hold, plug up the button hole and bore a new one, or introduce another damper wire.

When the whole or major part of the socket holes are misplaced, detach the socket and place it in a better position, by planing it or otherwise, as the case may require.

When the socket hole is broken, glue some cloth or leather round it.

When the damper head touches the shade.

When the damper head touches the top.

Noise in the Damper Levers.

When the hinge is loose or unsound.

When one lever touches another.

When the leather, if any, is too hard.

When the wood is unsound.

When the wood touches the slip.

When there is glue betwixt the hinge and edge of the slip.

When the last lever touches the key frame cheek.

When the lever touches any hard substance, detached or otherwise.

The Strings or Wires Jar or Jingle

When the damper wire is too close to the string.

When the strings touch each other.

When a string touches a rest pin.

When a string is not firm on the bridges.

When any brass work on the case is loose.

When any hard, detached substance is on the belly.

When the belly bridge is loose.

When the belly is unglued.

When the barring is loose.

When a castor is loose.

When the piano is not firmly placed on the floor.

When any detached, hard substance touches the piano.

When a brass hinge is loose, connected with the top.

When a wire touches the name board.

When a wire touches the break of the treble bridge.

When any detached, hard substance touches a string.

When a wire is unsound. In this case loosen it, detach it from the hitch pin and bridge pins, and rub it with leather. If that does not succeed, replace it with a new one.

When a damper cloth is hard, detach a thread or two with a marking awl.

When the cloth betwixt the belly bridge and right end block does not sufficiently damp the vibration of the strings.

When a covered string is loose, sometimes by rubbing it you may rectify it; but it generally happens that a new string is the only remedy.

When a bridge pin is loose.

When there is not sufficient side bearing.

When one string is thinner than the other.

When both strings are too thin.

When a string is confined by the pins on the belly bridge.

Defective Damping

Occurs when the damper is not sufficiently screwed into the lever.

When the damper cloth is too hard.

When two wires are not of the same height under the damper.

When two wires are of different thicknesses.

When the damper cloth does not bear equally on two strings.

When the damper cloth touches the next note.

When the pedal wire is too long.

When the damper wire sticks in the socket hole.

A Hammer Blocks

When the hopper is too far under the hammer. Unscrew it till the hammer falls off at about a quarter of an inch from the strings.

When the hopper spring is too weak, bend it to give it strength.
When the hopper check is too high, reduce it,
When the leather of the under hammer is not firm.
When the top of the hopper is not smooth, particularly on the inner edge, sandpaper and blacklead it.
When any part of the hopper is loose.
When the hopper strikes but one side of the under hammer, it must be placed in a right position.

A Hammer Sticks

Against the damper socket.
Against the next hammer head.
Against the long block. In these cases pare off as much leather as you can afford; alter the position of the hammer, or press it with a warm iron, as it may require.
When any glutinous substance adheres to it.
Against a damper wire.
Against the belly.

A Damper Sticks.

A damper sticks in the socket hole. You must open it, or unscrew the damper wire, and rub it with leather.
When the lever does not descend.
When the pedal wire does not act properly.
When the pedal foot sticks.

A Hopper Sticks

Against the under hammer. Examine the leather and hopper spring.
When the hopper spring does not operate in the groove
When the key sticks.
When placed on one side of the under hammer.
When the top is rough, sandpaper and blacklead it.
When the spring is too strong.
When the pin touches the hole of the front block.
When any part of the hopper is loose.

Damper Levers Stick

Against each other.
Against any detached substance.
Against the key-frame cheek.

To Alter the Touch.

When the touch is too shallow, glue some brown paper under the balance rail, till you obtain the depth requisite. If the hoppers are close to the under hammers, plane the bottom of the front rail. After you have succeeded in deepening the touch, reduce the hopper checks if too high.
When the touch is too deep, glue some paper under the front rail. If the hopper checks are too low, glue some more leather on them.
When any part of the keys is deeper or shallower in touch than the rest, you must operate as directed above, in that particular part alone.
When one key is deeper than the rest, reduce it on the balance rail.
When any key is shallower in touch than the rest, you must raise it on the balance rail, unless
When the hopper is too short; in this case, you must raise the hopper by glueing part of a card under it.
When the touch is too stiff, you must ease the hinges of the hammers and levers, if necessary, by removing the slip a little off the hinges, or by weakening them, if too stiff, with a marking awl.

When the hammer falls off too far from the strings, the touch is loose; remedy it by turning the hopper pin.

When the hopper is high, and the front of the key too low, plane off a little under the further end of the key.

Defects in the Pedal.

When the pedal wire, or stick, is too short to raise the dampers, lengthen it by fixing leather at the top.

When, by being too long, it raises the dampers too high, shorten it.

When the pedal foot is too close to the floor.

When the pedal foot is too high.

When the pedal foot pin is too tight.

When too loose, it rattles.

Defective Rest Pins.

When too small for the hole.

When the rest pin starts or jumps. This occurs when the wire has been wound on the pin with damp fingers, or when the block is unseasoned. A little chalk in the hole will often remedy this defect, which is very unpleasant in tuning.

When the wire is too high or too low on the rest pin.

When a rest pin, being too close to another, will not admit a tuning hammer.

When a rest pin is too close to the next string.

Hammers Touching the Wrong Strings.

When a single hammer, or minor part of the hammers, touches the wrong string, you must remedy them in the following manner:—

If the hammer head is too large, cut it.

If the hammer head is not too large, you must unhinge it, and replace it in a proper position.

If the wrong string it touches is not in its proper direction, you must remove it.

When a majority of the hammers strike the strings in a wrong direction, you must remove the key frame accordingly.

Causes which Prevent Pianos from Keeping in Tune.

When the rest pin is loose in the hole.

When the wire is not tight round the rest pin.

When the twist of the wire is not tight.

When the wire is too thick.

When the wire is defective.

When the hitch pin does not hold.

When a tuner pushes the rest pin sideways.

When the rest pin is turned too frequently.

When the rest pin is stopped in flattening the tone.

When the rest pin block is defective.

When the bracing is defective.

When the back is too thin.

When the bottom is too thin.

When either of the blocks is defective.

When the belly bridge is loose.

When the belly is unglued.

When the bridge on the long block is loose.

When the bridge pins are not firm.

When the damper wires touch the strings.

When the hammers block.

When the piano is not firm on the floor.

When the hammers do not strike the strings in a proper direction.

When the wood used in the construction of the case is unseasoned.

When the piano is very flat, it will never stand well in tune the first time, if drawn up to concert pitch.

When a new string is put on, it never stands in tune the first day.

On the Horizontal Grand Piano.

The peculiarities of the horizontal grand piano are the following: Its form resembles that of the harpsichord. The *case* is composed of *the bent side, the end, the back, the bottom, the rest pin block, bracing*, including the block from the bottom to the nether part of the belly, opposite the rest pin block. Several steel arches are screwed against both these blocks, to prevent them from yielding to the great pressure of the strings. Some makers have cast iron bracing. Another has steel and brass tubes, passing from the bent side to the rest pin block.

Defects.

Keys as in square, except friction against the dampers.

Hammers as in cabinet.

Dampers rattle in mortises when not well closed.

Wires jingle from most of the causes in square piano.

Defective damping—when the damper sticks in the socket, or between the keys, or from some of the causes in the square piano.

Hammers block when the lever is too far under the butt. Turn the regulating screw to the right, and let the hammer fall at about a quarter of an inch from the strings, as in the square piano.

When the hammer falls too soon, turn the screw to the left.

The lever spring will sometimes rattle or clatter, as also the lever, when loose.

The touch is generally altered by blocks or brackets under the balance rail, screwed up or down, as required.

Little brass screws are fixed to the hammer butts, in order to regulate the centre wire. In old grand pianos, the centre wires were bushed with leather, instead of cloth; the latter is a great improvement. Great caution is requisite in drawing out the key frame: lay hold of the hammer rail, and when the keys are sufficiently advanced, remove your left hand to the front of the key frame.

On the Upright Piano.

The form of the upright grand piano is nearly the same as that of the horizontal in a vertical position, except that it is squared from the best side, for ornament. Its action is principally like that of the horizontal, with some exceptions. The key frame, bearing the whole action except the dampers, is drawn out from behind, after letting down a flap that secures it. The dampers are behind the strings. The damper frame is fixed to the block by numerous little screws. The hammer is more apt to stick at its centre than that of the horizontal or cabinet, on account of its shank, which is much longer than either. When the instrument, having been in a damp or cold room, sticks at the centre of the hammer butt, take the action out, and let it remain some time before the fire. If the hammer still sticks at the centre, turn the butt-screw; if that does not succeed, remove the brass plate that covers the defective part, take out the centre wire, and rub it with leather and whitening; if after that it does not act freely, open the centre hole with a wire for that purpose. You must be very careful not to bend the centre wire in detaching or replacing it. To rectify a damper, it is often necessary to detach the damper frame. Sometimes the hammer butt, as in the cabinet and horizontal grand pianos, sticks in the

notches, which must then be filed. The soft pedal in this piano, as in the horizontal grand, moves the whole action on one or two strings, by touching a little bracket that slides up and down a notch or groove in the right end key block.

There are other pianos, as oblique, unique, boudoir, short upright, grand square, unichord, etc., nearly similar in action to the preceding instruments. The unique and oblique have their wires in a slanting direction. The short upright has its action in front. The grand square is a grand action in a square case, with the sounding board nearly covering the case. The unichord has but one unison. They are all subject to most of the defects mentioned in the preceding pages.

ON TUNING THE MELODEON, SERAPHINE, OR REED ORGAN.

The melodeon should be placed firm and level upon the floor to prevent any springing of the case, which may cause the reeds to strike against the sockets and produce a rattling or jarring sound, although this may be caused sometimes by small particles of dust drawing through the bellows, and preventing the vibration of the reed. Should this be the case, or any reed remain silent when the key is pressed down, the trouble may easily be remedied by taking out the key board, and removing the dust with the point of a knife.

Should any note become flat after using, it may be tuned by scraping the reed thinner at the *point;* or, if too sharp, by scraping at the *heel* of the reed. Care should be taken, in blowing, to press steadily upon the pedal, in order to produce a smooth and uniform tone. Too much pressure bends, and frequently flats, the reed.

Should a reed be fitted too closely in the socket, or by damp weather be caused to press against the socket, it may be liberated with a thin, fine file upon the inside of the mortise of the socket, without altering the tone of the reed.

There are such a variety of reed instruments, that it will be impossible to furnish information which will apply to every case. The rules here laid down will reach every ordinary instance. The *principles* of tuning are of course the same with those for the piano-forte. It is a favorite practice with many manufacturers to tune the popular keys as perfect as possible, throwing the imperfections among the remote keys. But no first-class instruments are tuned in this barbarous way, except when an ignoramus accidentally gets hold of them. In repairing a reed instrument, much depends upon the ingenuity and good sense of the practitioner.

Tuning Fork.—In tuning the notes of a musical instrument, such as the piano-forte, the first point is to fix upon some one note, by the pitch of which all others may be determined. The only way of retaining a permanent pitch for use is by having an instrument which time will not alter. A standard pitch is usually obtained, by the tuning fork, an instrument consisting of two steel prongs, extending from a steel handle. When these prongs are sharply struck, they vibrate, and if the instrument be then held to the ear, or placed upon the flap of a table, or any other sound-board, a low and pure sound is heard, if the prongs be perfectly equal. These tuning forks are usually made to sound either C or A.

The above is from "The Tuner's Guide," by permission of Messrs. O. Ditson & Co., Boston, publishers.

BOOK-KEEPING.

The Science of Single and Double Entry fully Explained, The Systems Compared Side by Side, Balancing Books, Settling Partnership Accounts, &c., &c., &c.

Book-keeping is the art of recording in a regular, concise, and systematic manner the transactions of merchants, traders, and other persons engaged in pursuits connected with money. There are two modes of keeping books of account; the one by what is termed *Single* and the other by *Double Entry*. The system of Single Entry is chiefly confined to the business of retail dealers; when transactions being limited to the detail of sales and purchases, for cash or credit, a single entry of the account in the ledger is sufficient for the purpose of a record. This, however, is but an imperfect and unsatisfactory mode of book-keeping; and, therefore, in the case of wholesale and mercantile business, recourse is had to the system of double entry. By this system each account is entered twice; first on the Dr. or Cr. side of one account, and afterwards on the contrary side of some other account. It has the advantage of keeping the merchant informed, not only of the goods sold, but of what remains on hand, without the trouble and inconvenience of frequently "taking stock;" and it also supplies a check by which errors may be detected, which, by the system of single entry, would probably escape notice.

In the form of book-keeping by *single entry* three books only are necessary—a Cash Book, Day Book, and Ledger. In the *Cash Book* all monies received and paid away should be entered. When goods are purchased for cash, the money being paid away, the entry is on the Cr. side, "By merchandise per Day Book." The cash should be balanced every month as soon after the last day of the month as possible.

The *Day Book* contains a record of the transactions of each day in the order in which they take place. The party concerned in the transaction, or customer, is named in full, with the term Dr. or Cr. annexed, according to the circumstances of the case; Dr. when you sell goods *to* him, and Cr. when you buy or receive goods *from* him.

The following instructions will serve as a general guidance for the keeping of a Day Book. The date of each entry must be inserted, and the names and addresses of customers written in full. When goods are received or purchased on credit enter under the term of Cr. and distinguish it with the word *By*. When goods are sold on credit add Dr. to the person's name and residence, and commence the entry with the word *To*. When abatement for short measure and discount are allowed by you, enter the person *Dr.*, and when similar allowances are made to you, enter the person *Cr.*

The *Ledger* is a book into which every transaction is entered from all other books, with certain references, indicating the sources from which the items are derived. In this book each customer's name has a certain space allotted to it, in which the goods sold appear on the Dr. side, and the cash and other considerations received, on the Cr. side:—

The principal books used for *double entry* are the Day Book, Cash Book, Journal, and Ledger. The *Day Book* ought to contain the main transac-

tions that occur in the several stages of business. All entries in this book should be fully intelligible, as it contains the major part of the materials from which the other books are formed. The *Cash Book* contains a record of every transaction that takes place in which cash bears a part; the entries are made roughly and at the time that they actually transpire in the same manner as other transactions are entered in the Day Book. The *Journal* is a book in which the scattered items of the Day Book and Cash Book are fairly entered and methodically arranged. The *Ledger* is the final depository into which the entries from the Journal are again transferred under their several heads. An *Index Book* is used in connection with the *Ledger* in which the names of all the accounts are alphabetically arranged with the number of the page of the Ledger opposite each. In double entry, it must be remembered that each item is entered *twice*, (once on the Dr. side of one account and once on the Cr. side of another account, for instance if we buy merchandise amounting to $500, and pay cash for the same the following would be our (*double*) entry.

Merchandise	Dr.	$500,00	
	To Cash		$500,00

It will be seen that this transaction is entered *twice*. The Dr. side shows that the merchandise has *cost us* $500. The Cr. side shows that we have paid away *cash* $500). GENERAL accounts are treated in precisely the same manner as personal accounts are treated in the single entry ledger. Thus accounts are opened with *Cash, Merchandise, Bills Receivable, Bills Payable, Interest, Commission, Profit and Loss, Trade Expenses, &c.*, just as though they were John P. Smith & Co., Peter Jones, or W. H. Norris; every item received or disbursed on their behalf being duly debited and credited to their account.

For instance, if we sell a lot of goods for John Jones and charge him a commission of $65, our entry would be thus

John Jones	Dr.	$65,00	
	To Commission		$65,00

also,

If we owed Peter Williams $750, and gave him a note for the amount with $25 interest added, this would be our entry.

Sundries	To Bills Payable		$775,00
Peter Williams		$750,00	
Interest		25,00	

Accounts are styled "Real" and "Representative;" such accounts as Interest, Commission, Profit and Loss, &c., are representative accounts and should be Debited and Credited for what they cost or produce. In the above cases "Commission" produces us $65,00 just as much as if John Jones had paid us so much money in hand, consequently we Cr. "Commission" with the amount produced. In the next case INTEREST has cost us $25,00 which we charge to that account, by thus doing, when we balance our books we are enabled to tell just what these different *representative* accounts have cost or produced us.

We here present in the first place, a complete set of books, kept after the method of single entry; in the second place, a set kept by double entry. In the single entry set we use the Cash Book, Day Book, Ledger and Bill Book. In the double entry set, we use the above-named books; also the Journal, the most important book connected with double entry, as the whole principle of double entry is attached to the Journal. If the Journal is wrong the Ledger will also be in error.

In both sets we have used the same Cash Book, with the identical items. The "double entry" day book contains *precisely* the same business transactions as the "single entry" day book with change in form of entries necessary to adapt it to "double entry." We do this so that the student may be enabled to distinctly see and understand the difference between the two methods and compare the one with the other. The transactions con-

tained herein are those of every day business life. We have endeavored to make them so plain that "a fool need not err therein." By the careful study of and attention to these pages, the student will be able to obtain all the information necessary to enable him to keep a set of books intelligently either by *single or double entry.*

In the single entry set, the items are traced directly from the Day and Cash Book to the Ledger and in the double entry set they are traced from the Cash and Day Book to the Journal, thence to the Ledger.

Amongst merchants and traders, it is usual to have a periodical adjustment of the account books; and before taking a general balance, it is necessary to prove the posting of the ledger, by making out a trial-balance. This is done by adding all the Dr. sides into one sum, and all the Cr. sides into another; these sums will be equal when the ledger has been correctly posted, but if any difference exists, there is certainly an error somewhere that requires investigation. If, however, any sum has been entered to a different account than the one to which it belongs, but on the same side, the two sums will still agree; and the only method to detect an error of this kind, is to have the journal and ledger compared by two persons, the one reading off the journal, and the other turning up the accounts in the ledger, and marking them, when correct, as he proceeds. When a journal entry is either wholly omitted, or twice entered in the ledger, the summing up of the Dr. and Cr. sides of the ledger will not detect the error; but if the cash received, cash paid, bills receivable, bills payable, and day-book entries, are added together, the sum will always agree with that side of the ledger which is correct, and lead to the detection of the error. Double entry would appear, at first sight, to be involved in inextricable confusion, but it is not so in reality, all transactions being governed by the following simple rule:—Anything *received*, the *receiver*, or the account on which anything is *received*, is Dr. Anything *delivered*, the *deliverer*, or the account on which anything is *delivered*, is Cr.

"By Journal laws, what you receive
Is Dr. made for what you give."

In journalizing the subsidiary books, and in posting the ledger, errors frequently occur; such as debiting or crediting one person on account instead of another; entering the sum too large or too small; omitting entries altogether; posting them twice, &c. Where errors of this kind are discovered they must be immediately corrected. And this must not be done by any erasure or interlineation, but by an entry explanatory of the mistake in the Day Book. The following is then to be journalized like a regular transaction and posted into the ledger: for instance, we will suppose that in the Ledger, John Rose is on the 8th of February debited to bills payable, but on the 31st of March it is discovered that this entry should have been posted to Henry Smart's account; Henry Smart is therefore debited to John Rose in the Day Book, and the mistake is thereby explained. If any account has been overposted, it must either be debited or credited for the excess; and if it has been underposted, a new entry must be made upon the same side for the deficiency. When an entry has been entirely omitted, it must be made whenever it is discovered, mentioning *when* omitted; and when an entry has been posted twice, it may be corrected by entering the amount on the other side, noting the fact of its being twice posted.

The most dangerous of all errors, are those which may be made in the original entries, and they should therefore be strictly guarded against. The balancing of books should not be delayed beyond a certain time, as too wide an interval renders the correction of any error a work of greater difficulty. It may also happen in the case where an account has been underpaid a year or two previously that the person has subsequently died, failed, retired from business, or have otherwise become inaccessible from any accidental circumstance that is likely to occur with the lapse of time.

In these instances a positive loss is sustained which might otherwise have been avoided.

In addition to the books already enumerated, other subsidiary books are generally used. The *Petty Cash Book* has a record of the various charges incurred in trade, which are too trifling to be entered separately in the cash book; such for instance, as postage-stamps, carriage of goods, &c.; this book is balanced once a month, and the total amount of expenditure transferred to the cash-book, under the head of petty cash. The BILL BOOK is used in the same manner in both Single and Double Entry. *Bills Receivable.* When a Note is received, it should be immediately entered under this head, and duly numbered; and when a Draft is accepted or Note paid away, it should be entered as *Bills Payable*; for each of these a separate book should be kept and the bills entered in the form we have given for the purpose.

Some merchants keep a CASH account and BANK account separate, that is, if they have $1000, on hand in cash and should deposit $300 of it in the City Bank, they would Debit (or charge) the bank with the amount and Cr. cash for the amount paid away, and when they draw any portion from the bank they Cr. the bank with the amount and debit cash with it, or if it is paid away to any one they charge the party with it.

The "Balance account" (see Ledger, page 441) in large establishments where they have a great number of accounts is frequently kept in a separate book, so as to avoid taking up so much space in the Ledger.

We have made this set of books (both the double and single entry) a partnership set, so as to enable the student to perceive just how partnership accounts are settled. After understanding this distinctly it will be an easy matter to understand the manner of settling or balancing the books when there is only one party interested. Some book-keepers use the term "Stock" to represent the proprietorship where there is only a single party interested; others use the personal name — either is perfectly correct. In all cases in closing the "Profit and Loss" account, each partner must be debited or credited (according to whether the business has made or lost) for his proportion of the gain or loss.

We have devoted a great deal of our space to the important subject of book-keeping, well knowing the *importance* of the subject. The student of book-keeping has an opportunity of studying the two different forms and seeing where they differ and how they differ and the advantages of one system over the other. THIS IS THE FIRST TIME within our knowledge that a set of books *precisely alike* as *regards* transactions have been "written up" in *both single* and *double* entry. One can easily see the advantage of having the two systems to compare side by side.

We have not introduced any calculations of INTEREST, AVERAGE, &C, at the close of this article, as is customary generally in works on book-keeping. We don't think there is any necessity for it as it all can be learned from the arithmetics with which the country is flooded: our purpose is to give matter that cannot be so easily obtained elsewhere.

These Eighteen pages contain the entire principles of both "Single and Double Entry Bookkeeping." Bear in mind

THE THING RECEIVED IS DR.
THE THING DELIVERED IS CR.
WHAT YOU OWE IS CR.
WHAT OWES YOU IS DR.

Dr. * *Cash.*

1875.					
Jany	1	Robert Smith invested as capital. ✓	10,000	00	
"	"	Wm. Jones " " " ✓	7,000	00	
"	12	Merchandise sold Phelps & Co. per D. B. †	600	00	
			17,600	00	

Cash. *Cr.*

1875.				
Jany	6	Mch'dise bo't of Sutton & Co. per D.B. †	150	00
"	12	Wm. Jones personal ✓	79	80
"	16	W. H. Norris amt. loaned him ✓	390	00
"	"	Peter Jones, paid him on account ✓	150	00
"	17	Robert Smith personal ✓	50	00
		Balance on hand	16,780	20
			17,600	00

*All *cash* items must be posted from the Cash Book, and *not* from the Day Book. ✓ Signifies that the item has been posted to Ledger. Either this mark ✓ can be used in posting C. B. to Ledger, or the page of Ledger can be entered in its place. Some accountants use one and some the other designation.

† The above items marked thus need not be posted to Ledger in *single* entry bookkeeping.

The Dr. side of the Cash Book is the *left hand* page always. The above is supposed to represent two distinct pages.

New York, January 1st, 1875. *Dr.* *Cr.*

		Robert Smith and Wm. Jones enter into co-partnership and commence business this day with capital as follows, viz. :				
‡	×	Robert Smith advances in cash per Cash Book $10,000				
‡	×	Wm. Jones do do do 7,000				
		Total 17,000				
		The above having been deposited in City Bank.				
	1	Wm. Jones also contributes in merchandise.				
		300 bbls Flour at $5,00			1500	00
		3				
	1	John P. Smith & Co., Boston, Mass. Cr.				
		By 376 bbls Flour (bo't of them on our Note at 3 months from this date) at $5,00			1880	00
		4				
	1	Joseph K. Wilson & Son, Phila. Pa. Cr.				
		By 400 bushels Wheat (bought of them on acc.) at $1,00			400	00
		6				
	‡ Cash	Cash. Cr.				
		By 75 bbls Potatoes (bought of Sutton & Co., at $2,00 150				
		paid as per Cash Book.				
		10				
	2	R. Brown & Co., Rochester, N. Y. Dr.				
		To 300 bbls Flour at $7,00		2100	00	
		sold them on their note at 3 months from date.				
		12				
	‡ Cash	Cash. Dr.				
		Sold Phelps & Co. for cash per C.B. 400 bushels Wheat at $1,50 $600,00 being invoice bo't of J. K. Wilson & Co., Jan'y 4th.				
		16				
	2	Peter Jones, City. Cr.				
		By bill rendered for office furniture and painting.			373	20
		17				
	2	Peter Jones, City. Dr.				
		To 10 bbls Flour (delivered him on acc. of bill rend.) at $7,00.		70	00	

Inventory.

*	366 bbls Flour cost 5,00	$1830	
	75 " Potatoes " 2,00	150	
		$1980	
†	Office Furniture	$373,20	
		$2353,20	

* The above shows the amount of goods or merchandise remaining on hand unsold.

† In "taking stock" as it is termed ; for the purpose of ascertaining amount on hand with a view of "closing the books" or balancing them so as to ascertain the amt. of profits or losses the business has sustained, it is customary to take account of furniture and fixtures on hand at the cost price in the same manner as merchandise.

‡ Need not be posted as it is posted from Cash Book.

× Signifies that the entries have been noticed and *not* passed over.

Bills Payable.

DATE.	NO.	DRAWN BY.	FAVOR OF.	WHAT FOR.	TIME.	AMT.	WHERE PAYABLE.	WHEN DUE.	REMARKS.
1875. Jany 3	1	Ourselves.	J.P. Smith & Co.	Bill of Jany 3d.	3 Mos.	$1880	City Bank.	†April 3|6	

The above shows the Notes ontstanding given by us.

Bills Receivable.

1

DATE.	NO.	DRAWN BY.	FAVOR OF	WHAT FOR.	TIME.	AMT.	WHERE PAYABLE.	WHEN DUE.	REMARKS.
1875. Jany 10	1	R. Brown & Co.	Ourselves.	Bill of Jany 10th.	3 Mos.	$2100	City Bank.	†Apl. 10|13	

The above shows the amount of Notes due us.

* The same form is used in both *Single* and *Double* Entry.

† The figures 3|6 and 10|13 imply that the Note is due on the 3rd in one instance and on the 10th in the other. The law allows 3 days additional in which to pay a Note after it becomes due—These 3 days are called "days of grace."

Dr. *Robert Smith.* *Cr.*

1875.						1875.					
Jany 17	To Cash	1	50	00		Jany 1	By Cash net capital	1	10000	00
" "	Balance		10393	24		" 17	" Net Gain		443	24
			10443	24					10443	24

Wm. Jones.

1875.						1875.					
Jany 12	To Cash	1	79	80		Jany 1	By Cash net capital	1	7000	00
" 17	" Balance		8796	96		" "	" Merchandise "	1	1500	60
						" 17	" Net Gain		376	76
			8876	76					8876	76

John P. Smith & Co., *Boston, Mass.*

1875.						1875.				
Jany 3	To Note at 3 months	1	1880	00		Jany 3	By Merchandise	1	1880	00

Joseph K. Wilson & Son, *Philadelphia, Pa.*

						1875.					
						Jany 4	By Merchandise	1	400	00

Dr. *R. Brown & Co.,* *Rochester, N. Y.* *Cr.*

1875.							1875.					
Jany	10	To Merchandise	1	2100	00		Jany	10	By Note at 3 months	1	2100	00

Peter Jones, *City.*

1875.							1875.					
Jany	16	To Cash	1	150	00		Jany	16	By bill of furniture, &c.	1	373	20
"	17	" Merchandise	1	70	00							
"	"	Balance		153	20							
				373	20						373	20

W. H. Norris, *City.*

1875.												
Jany	16	To Cash loaned	1	390	00							

SINGLE ENTRY. SINGLE ENTRY.

*Dr. Profit and Loss and Balances of our *Assets and †Liabilities. Cr.*

1875.					1875.				
Jany	17	Cash Balance on hand per Cash Book	16,780	20	Jany	17	Bills Payable outstanding	1880	00
"	"	Bills Receivable " due us " Bill "	2,100	00	"	"	J. K. Wilson & Son amt. due them	400	00
"	"	W. H. Norris " " " per Ledger	390	00	"	"	P. Jones amt. due him	153	20
"	"	Merchandise " on hand per Inventory	1,980	00	"	"	Balance being Net Capital	19,190	20
"	"	Office Furniture " " " " "	373	20			of which Robt. Smith's share is $10,393,24		
							" " Wm. Jones' " " $ 8,796,96		
			21,623	40				21,623	40

The method of arriving at or calculating the loss or gain is as follows, viz. :—

The Net Capital as above is	$19,190,20	
The total sum drawn by the partners from the business per Ledger is	129,80	
	19.320,00	
Net Capital when commencing business	18,500,00	
Showing Net Gain to be	$ 820,00	
The above amt. of $820, is now to be divided *pro-rata* (or according to amt. invested) between the two partners as follows, viz.:—Total amt. Invested as Capital	$18,500,00	
Amount Invested by R. Smith	$10,000	
" " " Wm. Jones	$ 8,500	
R. Smith's share of the total profits will be $\frac{10,000}{18,500}$ of $820		amtg to $443,24
W. Jones share of the total profits will be $\frac{8,500}{18,500}$ " "		" " $376,76
		Total profit $820,00

* Property on hand or accounts due us.
† Amount owing by us.

The $820 profit has of course been made on the merchandise bought and sold. We give below a statement of goods bought, sold and on hand. It will be seen that it agrees exactly with our statement of "Profit and Loss and Balance of Assets and Liabilities" although obtained by another method of figuring.

300 bbls Flour	at 5,00	$1500,00	
376 " "	at 5,00	$1880,00	
400 bush Wheat	at 1,00	$ 400,00	
75 bbls Potatoes	at 2,00	$ 150,00	
Total cost of Mdse			$3930,00
Sold.			
300 bbls Flour	at 7,00	$2100,00	
400 bush Wheat	at 1,50	600,00	
10 bbls Flour	at 7,00	70,00	
Total amount sold			$2770,00
Amount of Stock on hand.			
366 bbls Flour	at 5,00		
75 bbls Potatoes	at 2,00		
Total amt Stock on hand.			$1980,00
Profit of Mdse sold		820,00	
		$4750,00	$4750,00

When an account is settled it is customary to "rule off" the account as in the case of "R. Brown & Co."

In this set of books it will be seen that we commenced business January 1st and on January 17th we took "account of Stock and balanced our books for the purpose of informing ourselves in regard to the manner in which our business was going, that is, whether we were making money or losing it. We find from our "Balance Sheet" that during that time we have made a profit of $820. This amount we have credited in the Ledger to the account of the partners and allowed them each their proportion of the same. The difference then existing between the two sides of the Ledger (the Dr. and Cr.) shows the amount of interest each has in the firm or business. For the purpose of "closing the account" or "balancing it" we write the word "Balance" on the smaller side and enter the figures necessary to make one side equal the other. We then "rule off" the account. Now if we wish to continue the account on the same page we bring down the amount of balance and enter it on the first line under the ruling on the opposite side of the account and write the word "Balance." By so doing we reopen the account and take a new start. If the space allotted to the account has been filled with entries so that there is no room on that page, then we carry the "balance" to any other page we desire. These directions in regard to *balancing* apply to all *personal* accounts.

It will be seen that the accounts of "W. H. Norris" and "J. K. Wilson & Son" have not been "ruled off" as it is not customary or necessary to rule off except when there is more than one entry to the account. The principal reason for "ruling off" is so as to get the total amount of the account on a single line and each of these accounts are on one line only. Whenever the space allotted to an account becomes filled we foot up the two sides and enter the word balance and carry the amount of balance forward to another page, entering the page of the Ledger opposite, both to the page carried and from the page brought forward.

In posting accounts from the Day Book to the Ledger enter the Ledger folio on the Day Book and the Day Book folio on the Ledger, so that they can be easily referred to.

DOUBLE ENTRY JOURNAL. 1

New York, January 1st, 1875.

	Robt. Smith and Wm. Jones of N. Y. City have entered into co-partnership and commenced business this day, the capital consisting as follows :—				
	Sundries To Sundries.				
1	Cash	17000	00		
3	Merchandise	1500	00		
1	Robert Smith			10000	00
1	William Jones			8500	00
	Robt. Smith has advanced Cash $10000				
	Wm. Jones has advanced Cash $7000				
	" " " Mdse per D.B. 1500 8500				
	18500				
	3				
3	Merchandise Dr.	1880	00		
3	To Bills Payable			1880	00
	Bot of Jno P. Smith & Co on our note at 3 mos 376 bbls Flour as per D. B.				
	4				
3	Merchandise Dr.	400	00		
2	To Joseph K. Wilson & Son			400	00
	Bot of them 400 bushels Wheat on account per D. B.				
	6				
3	Merchandise Dr.	150	00		
1	To Cash			150	00
	Bot of Sutton & Co 75 bbls Potatoes per D. B. Paid them our check on City Bank.				
	10				
3	Bills Receivable Dr.	2100	00		
3	To Merchandise			2100	00
	For 300 bbls Flour sold R. Brown & Co on their note at 3 mos per D. B.				
	12				
1	Wm Jones Dr	79	80		
1	To Cash			79	80
	Paid him on personal account per C. B.				
	"				
1	Cash Dr	600	00		
3	To Merchandise			600	00
	Sold Phelps & Co 400 bushels Wheat per D.B.				
	16				
3	Office Fixtures Dr	373	20		
2	To Peter Jones			373	20
	Being amt of bill rendered for Office Furniture per D. B.				
	"				
	Sundries Dr				
1	To Cash			540	00
2	W. H. Norris amount loaned him	390	00		
2	Peter Jones paid him on account Office Fix.	150	00		
	17				
2	Peter Jones Dr	70	00		
3	To Merchandise			70	00
	Sold him 10 bbls Flour on acc bill Office Fixtures per D. B.				
	"				
1	Robert Smith Dr	50	00		
1	To Cash			50	00
	Paid him on personal acc per C. B.				
	"				
	Closing Entries				
4	Balance Dr	16780	20		
1	Cash			16780	20
	Amt on hand per C. B.				
	Carried Forward	41523	20	41523	20

DOUBLE ENTRY JOURNAL.

New York, January 17th, 1875.

		Brot Forward	41523	20	41523	20
4	Balance Dr		1980	00		
3	To Merchandise				1980	00
	Amt on hand per Inventory					
	"					
4	Balance Dr		2100	00		
3	To Bills Receivable				2100	00
	Amt Notes on hand in our favor					
	"					
4	Balance Dr		373	20		
3	To Office Fixtures				373	20
	Cost of same on hand					
	"					
4	Balance Dr		390	00		
2	To W. H. Norris				390	00
	Amount due us					
	"					
	Sundries To Balance				2433	20
3	Bills Payable sundry Notes outstanding		1880	00		
2	Joseph K. Wilson & Son amt due them		400	00		
2	Peter Jones amt due him		153	20		
	"					
3	Merchandise To		820	00		
2	Profit & Loss				820	00
	being amt of profit on Mdse sold to date					
	"					
2	Profit and Loss To Sundries		820	00		
1	Robert Smith				443	24
	for his share of gain					
1	Wm. Jones				376	76
	for his share of gain					
	"					
4	Sundries To Balance				19190	20
1	Robert Smith		10393	24		
1	Wm Jones		8796	96		
	For amt Capital Invested					
			69629	80	69629	80

In "Double Entry" the cash items are sometimes posted from the Cash Book direct to the Ledger and at other times they are carried to the Journal (as is the case in this set) and posted from that book to the Ledger. Either way is correct.

The term "Sundries" is used to avoid repetition—(see first Entry in "Double Entry Journal"). If the word "Sundries" was not used in this case the Entry would read thus,

Cash	Dr	10,000,00	
	To Robert Smith		10,000,00
Cash	Dr	7,000 00	
	To William Jones		7,000,00
Merchandise	Dr	1,500,00	
	To Wm Jones		1,500,00

By comparing the two entries the importance of "Sundries" will easily be seen.

Dr. *Robert Smith.* *Cr.*

1875.						1875.					
Jany 17	To Cash	1	50	00		Jany 1	By Sundries	1	10000	00
" 17	" Balance	1	10393	24		" 17	" Profit and Loss	2	443	24
			10443	24					10443	24

The first entry on Dr. side shows the amount drawn from the business for personal use; the "balance" shows the amount of interest now in the business.

The first entry on Cr. side shows the amount originally invested; the last entry shows the amount of profit which of course is added to the original investment. If a loss had occurred the entry of "Profit and Loss" would have been made on the Dr side, by which the interest in the business would have been lessened instead of increased.

Wm. Jones.

1875.						1875.					
Jany 12	To Cash	1	79	80		Jany 1	By Sundries	1	8500	00
" 17	" Balance	1	8796	96		" 17	" Profit and Loss	1	376	76
			8876	76					8876	76

The same rules apply to this account as to the previous one.

Cash.

1875.						1875.					
Jany 1	To Sundries	1	17000	00		Jany 6	By Merchandise	1	150	00
" 12	" Merchandise	1	600	00		" 12	" Wm. Jones	1	79	80
						" 16	" Sundries	1	540	00
						" 17	" Robert Smith	1	50	00
						" "	" Balance	1	16780	20
			17600	00					17600	00

The Dr. side of this account shows the amount of Cash received. The Cr. side the amount paid out. This account should agree with the Cash Book.

Dr. **Joseph K. Wilson & Son,** *Philadelphia, Pa.* *Cr.*

1875.						1875.					
Jany	17	To Balance	2	400	00	Jany	4	By Merchandise	1	400	00

Peter Jones, *City.*

1875.						1875.					
Jany	16	To Cash	1	150	00	Jany	16	By Office Fixtures	1	373	20
"	17	" Merchandise	1	70	00						
"	"	" Balance	2	153	20						
				373	20					373	20

W. H. Norris, *City.*

1875.						1875.					
Jany	16	To Cash	1	390	00	Jany	17	By Balance	2	390	00

Profit and Loss.

1875.						1875.					
Jany	17	To Sundries *	2	820	00	Jany	17	To Merchandise	2	820	00

*By referring to the partners account it will be seen that the above amount has been credited to each one proportionately.

The Cr side of this account shows the profit. If a loss had occurred the entry would have been on the Dr side.

Dr. *Merchandise.* *Cr.*

1875.							1875.					
Jany	1	To Sundries	1	1500	00	Jany	10	By Bills Receivable	1	2100	00
	3	" Bills Payable	1	1880	00	"	12	" Cash	1	600	00
	4	" J. K. Wilson & Son	1	400	00	"	17	" Peter Jones	1	70	00
	6	" Cash	1	150	00	"	17	" Balance	2	1980	00
	17	" Profit and Loss	2	820	00						
				4750	00					4750	00

The Dr. side of this account shows the cost of Merchandise. If there had been a loss instead of a profit, the "Profit and Loss" would have been entered on the Cr. side.

The Cr. side shows the amount sold and stock on hand. The $1980 above is the amount of stock on hand per Inventory. The difference between the two sides of the Ledger shows the profit to be $820, which has been entered to profit and loss.

Bills Payable.

1875.						1875.					
Jany	17	To Balance	2	1880	00	Jany	3	To Merchandise	1	1880	00

The Cr. side shows the amount of Notes outstanding against us. When a Note is paid enter it on the opposite side.

Bills Receivable.

1875.						1875.					
Jany	10	To Merchandise	1	2100	00	Jany	17	By Balance	2	2100	00

This account is of a similar nature to the previous one, although directly opposite in its operation.

Office Fixtures.

1875.						1875.					
Jany	16	To Peter Jones	1	373	20	Jany	17	By Balance	2	373	20

The Cr. side of this account shows the amount of Office Fixtures on hand per Inventory.

Dr. *Trial Balance.* *Cr.*

1875.											
Jany	17	To Cash		16780	20	Jany	17	By Robert Smith		9950	00
"	"	" Merchandise		1160	00	"	"	" Wm. Jones		8420	20
"	"	" Bills Receivable		2100	00	"	"	" Bills Payable		1880	00
"	"	" Office Fixtures		373	20	"	"	" Joseph K. Wilson & Son		400	00
"	"	" W. H. Norris		390	00	"	"	" Peter Jones		153	20
				20803	40					20803	40

A book is usually kept by large concerns for the purpose of entering the trial balances. It is usually written up at the end of every month; all accounts in the Ledger of every description are entered in this book, that is the balances. When the excess is on the Dr side of the Ledger the difference is entered on the Dr. side of the "Trial Balance Book" and when the excess is on the Cr. side of the Ledger, the difference is entered on the Cr. side. If the items have been correctly posted (as far as the amounts are concerned), the Dr. and Cr. sides of the Trial Balance should be equal.

19*

Dr. *Balance.* *Cr.*

1875.						1875.					
Jany	17	To Cash	1	16780	20	Jany	17	By Bills Payable	2	1880	00
"	"	" Merchandise	2	1980	00	"	"	" Joseph K. Wilson & Son	2	400	00
"	"	" Bills Receivable	2	2100	00	"	"	" Peter Jones	2	153	20
"	"	" Office Fixtures	2	373	20	"	"	" Sundries *	2	19190	20
"	"	" W. H. Norris	2	390	00						
				21623	40					21623	40

The Dr. side of Balance account shows the value of our Assets.
" Cr. " " " " " amount owing by us.

* The entry of "Sundries" on the Cr. side of the above applies to the united interest that the partners have in the business which can be seen by referring to their personal accounts.

* DOUBLE ENTRY.

Sundries To Sundries					
Merchandise		2257	50		
Interest (2 mos on J. Young's acceptance)		2	33		
Cash				1000	00
Bills Payable				600	00
Bills Receivable				200	00
Merchandise				303	00
Commission				60	00
Interest				96	83
Bot of J. H. Browning & Co., Boston, Mass.					
200 bush salt at 75c	$ 150,00				
200 bbls Flour at 6,00	1200,00				
50 boxes Cheese 1875 lbs at 10c	187,50				
30 csks Linseed Oil 720 gls at 1,00	720,00				
	$2257,50				
Paid them as follows, viz :—					
Our cheque on City Bank for	$1000,00				
" Note at 3 mos from date for	600,00				
Acceptance of J. Young (due in 2 months)	200,00				
10 bags Java Coffee 1010 lbs at 30c	303,00				
Amount Commission due us for goods sold for J H B & Co	60,00				
Amount Interest due in their favor (old account)	96,83				
	$2259,83				
Sundries To Sundries					
Cash		1262	62		
Interest (or Discount)		37	38		
Bills Receivable				500	00
Bills Payable				800	00
The City Bank has discounted Note of Wm. P. Smith favor ourselves and due May 13th 3 months from this date also					
Our own Note at 6 mos					
Amount face Smith's Note	500,00				
Less 3 mos Interest	9,04				
	$490,96				
Amount face our own Note	800,00				
Less 6 mos Interest	28,00				
	$771,66				
City Bank Dr	300,00				
To Cash	300,00				
Amount deposited per Pass Book					
Cash Dr	50,00				
To City Bank	50,00				
Amount drawn per Check Book					

* This last form is entirely independent of the other transactions contained in this work. It stands alone by itself. We have introduced the first entry for the purpose of furnishing *a study* for the student who will see that it is somewhat complicated but we have made it so plain that he will not be long in understanding it. It is an entry that beautifully illustrates the grand system of double entry bookkeeping. The second entry also shows for itself ; we have had our own note discounted at the bank, also a note that was due us from another party, and the above entry is applicable to the case. The last two entries are fully explained on page 428.

LETTER WRITING.

Introductory, Its Use and Progress, How Letters should be Written, Rules for Spelling, Pronunciation, Grammar, &c.

Introductory.

The importance of epistolary writing is such, that it is almost useless to insist upon the advantages that result from it; the more so, because all who can boast of this accomplishment must be fully sensible of its sterling value, which nothing can depreciate. On the contrary, persons who are unable to convey their sentiments to a friend without the assistance of a third person, feel the unpleasant situation in which their ignorance places them, with keen regret; to such no arguments can be necessary to convince them that it is their own interest they promote, when they endeavor to become acquainted with a branch of knowledge so likely to prove extremely useful, beneficial, and pleasant. Letter-writing is also still more agreeable, because it enables us to hear from our friends, and to communicate to them our affairs and wishes, however distant we may be, and this too under the bond of secrecy, at least it is so in this country where freedom reigns to bless us.

Had letters been known at the commencement of the world, epistolatory writing would have been coëval with love and friendship; for, as soon as they began to flourish, the verbal messenger was stopped, and the affectionate language of the heart was then committed to characters which faithfully preserved it. Secrecy was ensured, and the intercourse of social life rendered more easy, and infinitely more agreeable.

Many of the most ancient compositions were written in this manner, and even the Holy Gospel was delivered by the Apostles in an epistolary form.

The Romans attained perfection in this art; as a proof of which, we need only to produce the elegant letters of Cicero; nor are the moderns less aware of its importance and its beauties. Amongst the French, many of their first writers have built their fame upon epistolary correspondence; and our own countrymen of the present age, appear to be fully sensible of its merits and utility. Indeed, epistolary writing appears in some degree to have triumphed over every other species of composition; the historian has adopted it; we have the Greek and Roman histories, as well as that of our own nation, elegantly executed in this style of writing. The novelist also finds it better adapted to his purpose than any other mode of writing. Poets have also resorted to it; and travellers find it to be their only consolation during the lingering period of absence from friends justly endeared to their hearts.

Letters are the very fountain of trade, the food of love, the pleasure of friendship, the enjoyment of the politician, and the general entertainment of all mankind; as, without their pleasing medium, we should find ourselves miserably curtailed in every comfort and amusement; because, next to speaking to those we love, an epistolary correspondence with them is the greatest blessing we can possibly enjoy.

The Rise and Progress of Writing.

Next to speech, writing is the most useful art of which men are possessed. Writing is an improvement upon speech, and therefore must

have been posterior to it in order of time. At first, men thought of nothing more than communicating their sentiments to one another when present, by means of words or sounds which they uttered. Afterwards, they devised this further method of mutual communication with one another, when absent, by means of marks or characters presented to the eye, which we denominate Writing.

Written characters are of two kinds: either signs for things, or signs for words. The signs for things, are the pictorial hieroglyphics and symbols, employed by the ancient nations; the signs for words, are the alphabetical characters now employed by all civilized nations.

Pictures were, undoubtedly, the first attempt towards writing; and, as mankind are naturally fond of imitation, some methods have been obtained in all ages, and among all nations, of copying or tracing the likeness of sensible objects. Those methods would soon be employed by men for giving some imperfect information to others at a distance, of what had happened; or, for preserving the memory of facts which they wished to record. Thus, to signify one man had killed another, they painted the figure of a dead man stretched upon the earth, and of another standing by him with a hostile weapon in his hand. When America was first discovered, this was the only kind of writing known in the kingdom of Mexico. By historical pictures, the Mexicans are said to have transmitted to posterity the most important transactions of their empire. These, however, must have been extremely imperfect records; and the nations who had no other must have been very gross and rude. Pictures could do no more than delineate external events. They could neither exhibit the connections of them, nor describe such qualities as were not visible to the eye, nor convey any idea of the dispositions or words of men.

To supply in some degree, this defect, there arose, in process of time, the invention of what are called hieroglyphical characters; which may be considered as the second state of the art of writing. Hieroglyphics consist in certain symbols, which are made to represent invisible objects, on account of an analogy or resemblance which such symbols were supposed to have to the objects themselves. Thus an eye was the hieroglyphical symbol of knowledge; a circle, of eternity, which has neither beginning nor end. Hieroglyphics, therefore, were a mere refined and extensive species of painting. Pictures delineated the resemblance of external visible objects; hieroglyphics painted invisible objects, by analogies taken from the external world.

Egypt was the country where this sort of writing was most studied and brought into a regular art. In hieroglyphics was conveyed all the boasted wisdom of the priests. They pitched upon animals to be the emblems or hieroglyphics of moral objects, according to the properties or qualities which they ascribed to them. Thus, ingratitude was denominated by a viper; imprudence, by a fly; wisdom, by an ant; a man universally shunned, by an eel, which they supposed to be found in company with no other fish.

But as many of those properties of objects which they assumed for the foundation of their hieroglyphics, were merely imaginary, and the allusions drawn from them forced and ambiguous, this sort of writing could be no other than enigmatical and confused in the highest degree, and consequently must have been a very imperfect vehicle of knowledge.

From hieroglyphics, mankind gradually advanced to simple arbitrary marks which stood for objects, though without any resemblance or analogy to the objects signified. Of this nature was the method of writing practised among the Peruvians. They made use of small cords of different colors; and by knots upon these of various sizes, and differently arranged, they invented signs for giving information and communicating their thoughts to one another.

Of this nature also, are the written characters which are used to this day throughout the vast empire of China. The Chinese have no alphabet

of letters, or simple sounds, of which their words are composed, but every single character which they use is expressive of an idea; it is a mark which stands for some one thing or object; consequently the number of these characters must be immense. They are said to amount to seventy thousand. To read and write them to perfection is the study of a whole life, which subjects learning among them to infinite disadvantage, and must have greatly retarded the progress of every kind of science.

As to the origin of the Chinese characters there have been various opinions, but the most probable one is, that the Chinese writing began, like the Egyptian, with pictures and hieroglyphical figures; and these, in process of time, became abbreviated in their form, for the sake of writing them with greater facility. In consequence their number became enlarged, and at length passed into those marks or characters which they now use, and which have spread themselves through several nations of the East. For we are informed that the Japanese, the Tonquinese, and the Corolans, who speak different languages from one another, and from the inhabitants of China, use, however, the same written characters with them; and by this means, correspond intelligibly with each other in writing, though ignorant of the language spoken in their several countries; a plain proof that the Chinese characters are, like hieroglyphics, independent of language, are signs of things, not of words.

Our arithmetical figures, 1, 2, 3, 4, 5, 6, 7, 8, 9, &c., give a very good example of this sort of writing. They have no dependence on words, each figure denotes the number for which it stands: and, consequently, is understood by all the nations who have agreed in the use of these figures.

But, in process of time, different nations became sensible of the imperfections, the ambiguity, and the tediousness of each of these methods of communication; they therefore began to consider, that by employing signs that should stand not directly for things, but for the words by which things were distinguished, a considerable advantage would be gained. The first invention of this sort seems to have been an alphabet of syllables instead of an alphabet of letters. Such a one is said to be retained to this day in Ethiopia, and some countries in India. But still, it must have been highly imperfect, as the number of characters was very great, which rendered both reading and writing exceedingly complex and laborious; till, at last, some happy genius arose, and tracing the sounds made by the human voice to their most simple elements, reduced them into vowels and consonants; and by affixing to these the signs which we now call letters, taught men how, by their combinations, to express in writing the various combinations of sound which they employed in speech. By being reduced to this simplicity, the art of writing was brought to its highest state of perfection; and, in this state we now enjoy it in all the countries of Europe and America.

To whom we are indebted for this sublime and refined discovery, is not determined. The alphabet was first brought into Greece by Cadmus, a Phœnician. It then contained only sixteen letters; the rest were afterwards added according as signs for proper sounds were found wanting. It is curious to observe, that the letters which we use at this day, can be traced back to this very alphabet of Cadmus (who flourished in the time of King David). It is observed by learned men, that the ancient Greek characters have a remarkable conformity with the Hebrew or Samaritan characters, which, it is agreed, are the same with the Phœnician, or the alphabet of Cadmus.

The ancient order of writing was from the right hand to the left. This manner of writing existed among the Abyssinians, Phœnicians, Arabians, and Hebrews; and, from some very old inscriptions, it also appears to have prevailed among the Greeks. They afterwards adopted a new method, by writing their lines alternately from the right to the left, and from the left to the right, which they called Boustrophedon, or writing after the manner in which oxen plough the ground. This manner of writing continued to the days of Solon, the celebrated legislator of Athens. But at length the

motion from the left hand to the right being found more natural and commodious, the practice of writing in this direction prevailed throughout all the countries of Europe.

Writing was at first engraven on pillars and tablets of stone, afterwards on plates of the softer metals, such as lead. In proportion as writing became more common, lighter and more portable substances were employed. The leaves and the bark of certain trees were used in some countries; and in others, tablets of wood, covered with a thin coat of soft wax, over which the impression was made with a stylus or pen of iron. In later times the hides of animals, properly prepared and polished into parchment, were the most common materials. Our present method of writing on paper, is an invention of no greater antiquity than the fourteenth century.

AN EASY INTRODUCTION TO GRAMMAR,

Calculated to assist persons in Letter-writing, as far as respects accuracy.

Grammar.—English grammar is the art of speaking and writing the English language correctly.

It is divided into four parts, Orthography, Etymology, Syntax, and Prosody.

Orthography shows the nature and power of letters, and the proper method of spelling words.

Etymology treats of the classification, properties, and derivation of words.

Syntax teaches the agreement, and placing of words in the construction of sentences.

Prosody directs the correct pronunciation of words, and the laws of versification.

Orthography.—The English alphabet contains twenty-six letters:—

A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z.

Of these, five are always vowels, viz. a, e, i, o, u, and sometimes w, and y, of which latter letters, when either begin a word or a syllable, they are, consonants, but in other situations they become vowels.

A vowel forms a perfect sound when uttered alone, but a consonant cannot be distinctly uttered till joined to a vowel.

Consonants are either mutes or semi-vowels. The mutes cannot be sounded at all, without the aid of a vowel: they are, b, p, t, d, k, and c and g hard.

The semi-vowels have an imperfect sound when alone; as f, l, m, n, r, v, s, z, and c and g soft. L, m, n, r, are called liquids, because they seem to flow into the sound of other letters. Two vowels united in the same syllable form a diphthong, as Cæsar; three, a triphthong, as beauty.

Syllables.—A syllable consists of one or more letters, forming one sound: as a, it, though. A single consonant between two vowels belongs to the latter syllable, as bo-som, ri-val; except in compound words, as un-arm, mis-use; and syllables ending with x, as ex-alt, ex-ile.

Two consonants coming immediately together, are separated; as ad-der, bet-ter, vel-lum; except such as can begin a word, as a-ble, o-gle, lu-cre. Three consonants proper to begin a word, are not separated when a long vowel precedes; as re-strain, de-stroy; but a preceding short vowel takes the first consonant into its syllable; as dis-train, mis-trust.

When three or four consonants, which cannot begin a word, meet between two vowels, such of them as can be spelled together belong to the latter syllable; the rest to the former; as in in-stant, in-struct, trans-gress, A-bing-don.

Two vowels, not being a diphthong, belong to separate syllables; as briar, o-ri-ent, in-e-bri-ate.

Compound and derivative words are generally resolved into their primitives; as ink-horn, not-with-stand-ing.

Words.—Words are sounds which we make use of to express our ideas.

A word is denominated primitive, when it is not formed from a simple word in the language; as harm, great, connect, derivative, when it is formed from a simple word; as harm-less, great-ly, con-nect-ed; un-con-nect-ed.

A compound word consists of two or more simple words; as waterman, shoemaker, nevertheless, notwithstanding, etc.

A monosyllable is a word of one syllable; a dissyllable, of two syllables; a trisyllable, of three syllables; a polysyllable, of more than three syllables.

Rules for Spelling.—Monosyllables ending in f, l, or s, preceded by a single vowel, double the final consonant, as muff, bull, lass; except if, of, as, was, yes, is, his, this, us, thus.

When the vowel precedes any other consonant, that consonant remains single; except ebb, add, odd, egg, ann, inn, butt, buzz, purr.

An added termination does not change the orthography of a primitive word.

Exceptions—Primitives accented on the last syllable, and ending in a single consonant preceded by a single vowel, generally double their final letter, when they are prefixed to a syllable commencing with a vowel, as rob, robber; fun, funny; hot, hotter, hottest; begin, beginning. But l final is frequently doubled, when its syllable is not accented; as duel, duelling, revel, reveller.

The final e of the primitive word, is generally omitted before able, ible, ing, ish; as blame, blamable; force, forcible; rave, raving: white, whitish; except singe, singeing; dye, dyeing, etc. But when able follows e preceded by c or g soft, the general rule is observed; as peace, peaceable; charge; chargeable. The final of the primitive word is omitted in judgment, abridgment, acknowledgment.

Primitives ending in ll generally reject one l before full, ness, less, ly; as skill, skilful, dull, dulness, etc. In other combinations, they also frequently drop one l; as in always, fulfil, miscal, enthral, welfare.

The final y of the primitive word, when preceded by a consonant, becomes i before a syllable beginning with a consonant; as merry, merrily, merriment; cloudy, cloudiness. It undergoes the same change in forming verbal nouns, past participles, the persons of verbs, the plurals of nouns, and the degrees of adjectives; as carry, carrier, carried, carriest, carries, carrieth; ally, allies; merry, merrier, merriest.

Participles ending in ing retain the y, that i may not be doubled; as carry, carrying; rally, rallying.

Y preceded by a vowel in such instances as the foregoing, follows the general rule; except lay, pay, say; which becomes laid, paid, said, unlaid, repaid, aforesaid.

The orthography of other words may be ascertained by consulting Webster's or Worcester's Dictionary.

Etymology.—There are nine sorts of words, or parts of speech. 1st. Substantive or noun—2nd, Article—3rd, Adjective—4th, Pronoun—5th, Verb—6th, Adverb—7th, Preposition—8th, Conjunction—9th, Interjection.

The Substantive or Noun.—A substantive is the name of a thing—and it is either common or proper. A common substantive is a name common to many things; as man, region, city. A proper substantive is a name distinguishing an individual; as George, America, York. A name signifying a number of individuals, is denominated a collective noun, as troop, sheep, herd.

The Article.—An article points out a substantive, or determines its signification. There are two—the indefinite an, sometimes shortened into a; and the definite the. The indefinite articie ascertains the noun in an uncertain manner; as a man, that is any man. The definite article points out the particular thing mentioned, as the man, the ships.

An drops its n before all the consonants, except h mute, and aspirated words accented on the second syllable; as, a cow, a house;—a also precedes u long, and the words ewe and one.

The Adjective—Is used to express the quality of a thing; as good, European, one, second,double, any, nutbrown, etc.

Pronouns.—A pronoun is used instead of a noun, and, like substantives, they have the properties of person, gender, number and case. There are three kinds of pronouns—1st. Personal: I, thou, he, she, it—2nd, Adjective or possessive: my, thy, his, her, its, our, your, their—3rd, Relative: who, which, what, that. A personal pronoun merely supplies the place of a noun. The possessives are equivalent to the genitives (singular and plural) of the personals—and the relative pronoun is substituted for a personal and a conjunction.

The Verb.—A verb signifies to be, to do, or to suffer; and is therefore neuter, active, or passive; as, I am, I conquer, I am conquered.

The Adverb.—Adverbs are joined to verbs and adjectives, to express some quality or circumstances; they express in one word what would otherwise require two or more, as hither, for, to this place; hence, for, from this place, etc., etc.

The Preposition.—A preposition is placed before a substantive, to connect it with other words; the principal prepositions are—after, about, above, among, amid, against, along, around, behind, at, before, below, beneath, beside, between, beyond, by, down, for, from, in, into, of, off, on, over, since, through, till, to, up, upon, with, within, without, etc., etc.

The Conjunction.—Conjunctions connect either words or sentences. They are either copulative, disjunctive, or adverbial. The copulative express an addition, a cause, or a supposition; they are: and, both, but, because, for, that, if.

The disjunctives express opposition of meaning; they are, or, not, either, neither, than, though, unless, lest, but, whether, notwithstanding.

Adverbial conjunctions are words which when not used as connectives are simply adverbs; as, also, then, when, whenever, where, wherever, whither, whence, hence, since, likewise, as, therefore, wherefore, however, nevertheless, else, yet, until, otherwise, even.

The Interjection.—Interjections express the passions of the mind. The principal interjections are, Ah! Alas! Ha! Oh! Huzza! etc.

Prosody.—The principal thing in prosody is to be acquainted with the stops, as they serve to regulate the voice in reading, and to prevent confusion and perplexity; their names and marks are as follows:—

Comma	,	Period or full point	.
Semicolon	;	Note of Interrogation	?
Colon	:	Note of Admiration	!

The comma marks a small part of a sentence, where a short breathing time may be permitted without injuring the sense, and allows you to stop while you can deliberately say one. The semicolon divides the sense into portions, and allows you to stop while you can count one, one. The colon marks where the sense is complete, but not the sentence, and allows you to stop while you can count three. The period marks where the sense is complete, and allows you to stop while you can count four. The note of interrogation is placed after all questions; and the note of admiration after all sudden emotions of the soul, or every thing which gives surprise; the breathing times at both are the same as at the period.

Syntax.—Syntax, or the composition of sentences, teaches you to apply what you have learned in the foregoing rules. A sentence must contain,

absolutely, at least one affirmation and one name, of which something is affirmed, as, God is just. This is called a simple sentence; but if we say, God is just, but man is unjust, it is a compound sentence, as it contains two simple sentences joined together by the conjunction but.

The principal rule in the construction of sentences is, that the affirmation must agree with the name in number and person, as, John runs well, where the proper name, John, and the affirmation runs, are both of the third person singular, and consequently agree to find the name in any sentence which should agree with the affirmation, ask the question, Who? and the answer given to it, as in the above sentence, say, Who runs well? Answer, John.—John is therefore the name to agree with the affirmation, runs.

The name of multitude must be singular; thus, the crowd *is* great, not *are* great, because it is but one crowd.

When two singular names are joined together by a conjunction, the affirmation must be plural; thus, Bill and Tom fight, not fights.

The a, or and, and the, come before names and qualities; as is placed before a consonant, and before a vowel, and the, indifferently before both; but sometimes in construction they are placed between the quality and the name, as, so fair a face, so good an example, how great the gift, etc.

Necessary Directions for Letter Writing.—Writers of letters on business or trade should never for one moment lose sight of the subject under discussion; they should be worded as briefly as may be consistent with the subject they are written on. In short, a good writer, whatever may be his subject, will never forget that a comprehensive idea of it, given in short but forcible language, is the most certain method of ensuring approbation.

Relatives, in their correspondence, must always consider their own characters. Thus a father, when writing to his son, will preserve his superiority by a gentle degree of authority; and a son will never lose sight of the manner in which he can best express his sense of filial duty. In friendship the heart will express its sentiments, with an honest and confident freedom. It will bestow its applause with pleasing sincerity, and censure with modest reluctance.

In letter writing, however, the grand aim should be, to write exactly in the same manner in which we should converse with persons to whom we are writing, were they present; if we do so, we shall seldom fail to write well.

A strict attention to the preceding grammar, and the above-mentioned directions, will soon convince the learner, that he has not wasted his time in a fruitless pursuit. Indeed, by devoting ourselves seriously to the study of any art, we may ultimately surmount every difficulty. Every writer should cautiously avoid affectation, his style should be clear, his sentiments judicious, and his language plain, yet sensible and elegant; by which line of conduct, his letters will always give pleasure, and be intelligible to every capacity.

Consideration in all matters of business is absolutely necessary, and before any letter of importance is written, some time should be devoted to this requisite point; by attending to which, much serious trouble and mischief may be avoided, while the end proposed will be certainly facilitated.

Pronunciation.—The principal rules of pronunciation are as follows:—C before *a*, *o*, and *u*, and in some other situations, is a close articulation like *k*. Before *e*, *i*, and *y*, *c* is precisely equivalent to *s* in same, thus, as in *cell, cider, cypress.* E final indicates that the preceding vowel is long, as in *hate, mete, sire, robe, lyre, abate, recede, invite, remote, intrude.* E final indicates that *c* preceding has the sound of *s*, as in *lace, lance;* and that *g* preceding has the sound of *j*, as in *charge, page, challenge.* E final in proper English words never forms a syllable, and in the most used words in the terminating unaccented syllable, it is silent; thus, *nature, genuine, examine, granite,* are pronounced *natur, genuin, examin, granit.* E final in some words of foreign

origin forms a syllable—*syncope, simile.* E final is silent after *l* in the following terminations, *ble, cle, dle, fle, gle, kle, ple, tle, zle,* as in *able, manacle, cradle, raffle, mangle, wrinkle, supple, rattle, puzzle,* which are pronounced *ab'l, man'acl, cra'dl, raf'fl, man'gl, wrin'kl, sup'pl, puz'zl.* E is usually silent in the termination *en,* as in *token, broken,* pronounced *to'kn, bro'kn.* Ous in the termination of adjectives and their derivatives is pronounced *us,* as in *gracious, pious, pompous.* Ce, ci, ti, before a vowel, has the sound of *sh,* as in *cetaceous, gracious, motion, partial, ingratiate,* pronounced *cetashus, grashus, moshon, parshal, ingrashiate.* Si, after an accented vowel, is pronounced like *zh,* as in *Ephesian, confusion,* pronounced *Ephezhan, confuzhon.* When ci or ti precede similar combinations, as in pronunci*ation*, negoti*ation*, they may be pronounced *ce* instead of *she,* to prevent a repetition of the latter syllable, as *pronunceashon* instead of *pronunsheashon.* Gh, both in the middle and at the end of words, is silent, as in *caught, brought, fright, nigh, sigh,* pronounced *caut, baut, frite, ni, si.* In the following exceptions, however, gh is pronounced as *f: cough, chough, clough, enough, laugh, rough, tough, trough.* The seven sounds which the combination *ough* variously assumes, are illustrated in the following couplet:—

> "Though the rough cough and hiccough plough me through,
> 'Mid life's dark lough my course I still pursue."

When wh begins a word, the aspirate h precedes *w* in pronunciation, as in *what, whiff, whale,* pronounced *hwat, hwiff, hwale, w* having precisely the sound of *oo*; in the following words *w* is silent: *who, whom, whose, whoop, whole.* H after *r* has no sound as in *rheum, rhyme,* pronounced *reum, ryme.* H should be sounded in the middle of words, as in fore*h*ead, ab*h*or, be*h*old, ex*h*aust, in*h*abit, un*h*orse. H should always be sounded except in the following words: heir, herb, honest, honor, hospital, hostler, hour, humor, humble, and all their derivatives, as honestly, honorable, &c. K and g are silent before *n,* as *know, gnaw,* pronounced *no, naw.* W before *r* is silent, as in *wrong, wreath,* pronounced *rong, reath.* B after *m* is silent, as in *dumb, numb,* pronounced *dum, num.* L before *k* is silent, as in *baulk, talk, walk,* pronounced *bauk, tauk, wauk.* Ph has the sound of *f,* as in *philosophy,* pronounced *filosofy.* N after *m,* and closing a syllable, is silent, as in *hymn, condemn.* P before *s* and *t* is mute, as in *psalm, pseudo, ptarmigan,* pronounced *sahm, sudo, tarmigan.* R has two sounds, one strong and vibrating, as at the beginning of words and syllables such as *rock, reckon, raw;* the other at the termination of words, or when it is succeeded by a consonant, as *farmer, morn.* Before the letter *r* there is a slight sound of *e* between the vowel and the consonant; thus, *bare, parent, mere, mire, more, pure,* are pronounced nearly *baer, paerent, meer, mier, moer, puer.* There are other rules of pronunciation affecting the combination of vowels, &c.; but the foregoing are the chief.

Errors made in pronunciation are very numerous, and many of them grate offensively on the ear; the abuse of the letter H, being aspirated when it should be silent, and silent when it should be aspirated, is one of the most prominent of these faults. Pronouncing the letter *u* as though it were *oo* is also another error very generally committed. The interchange of *w* for *v,* and *v* for *w;* the sound *k* instead of *g* at the termination of words, as somethin*k*, nothin*k*; the addition of *r* at the end of words ending in vowels, as idea*r*, Eliza*r*; and the pronouncing of words ending in *ow* as though they were spelt *er*—are all of them offences against correct pronunciation and good taste. A glaring error, even amongst intelligent persons, is dropping the final consonant in a word, such as bread an' butter, what will you gi'e for it, no more o' that, instead of bread an*d* butter, what will you give for it, no more *of* that. To attain a faultless pronunciation, a person should exercise himself in writing down certain sentences, repeating them to himself, and correcting errors which fall upon his ear, until he is perfect

INFORMATION CONCERNING PATENTS.

How to Obtain Them, Length of Time Required, Amount of Fees, Forms for Patents, Caveats, Assignments, Licenses, Shop Rights, &c. Compiled Chiefly from the Official Rules and Regulations for Proceedings in the Patent-office.

Caution to Persons Desiring and Applying for Patents.—If you have a new invention, or one at least that you think is new, and desire to obtain a patent for it, be extremely cautious to whom you exhibit the same, and especially so in regard to whose hands you place it into for the purpose of obtaining a patent. Many valuable inventions have been lost to the inventor from the fact of their having shown the invention to unscrupulous persons, who, being *sharp*, as it is termed, have taken the advantage of this confidence, and, by changing the invention slightly, have obtained patents for themselves, while the originator was getting ready, little thinking what was in store for him.

Patents in very many cases have been denied inventors from the fact of their having placed them in the hands of inexperienced agents, who, although they pretended to know all the ins and outs in relation to the method of procuring patents, really knew but little, and what little they did know *proved a serious damage to their clients.*

We know that in some cases it is hard to tell who to go to, as there are so many that make the procuring of patents a business, and for this reason we take up much of our valuable space for the purpose of trying to enlighten our friends and to lead them aright.

We would recommend all and any who have any new inventions that they desire patented, to place them in the hands of Messrs. MUNN & CO., No. 37 Park Row, New York City. They have been actively engaged in the business of obtaining patents for over Thirty Years. Many thousands of inventors have had benefits from their counsel. And a very large proportion of all patents granted have been obtained through them.

Those who have made inventions, and desire to consult with them in regard to obtaining patents, are cordially invited by them to do so. They will be happy to see them in person at their office, or to advise them by letter. In all cases, they may expect from them an *honest opinion.* For such consultations, opinions, and advice, *they make no charge.*

Having access to all the patents, models, public records, drawings, and other documents pertaining to the Patent Office, they are prepared to make examinations, and give opinions upon all infringement questions, advice as to the scope and ground covered by patents, and direct with vigor any legal proceedings therewith connected. Their clients are numbered by hundreds of thousands. They are to be found in every town and city of the Union. Such a thing as the betrayal of a client's interests, when committed to their professional care, never has occurred, and is not likely to occur. It is enough to say that they are the publishers and proprietors of the Scientific American, a paper having a circulation of nearly 50,000 copies, and is known and read all over the world.

May Obtain a Patent.—Any person, whether citizen or alien,

being the original and first inventor or discoverer of any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent for his invention or discovery.

Joint inventors are entitled to a joint patent; neither can claim one separately; but independent inventors of separate improvements in the same machine cannot obtain a joint patent for their separate inventions; nor does the fact that one man furnishes the capital and the other makes the invention entitle them to take out a joint patent.

In case of an assignment of the whole, or of any undivided interest in the invention, the patent may issue to the assignee of the whole interest, or jointly to the inventor and the assignee of the undivided interest, the assignment being first entered of record, and the application being duly made and the specification duly sworn to by the inventor.

The application must be made by the actual inventor, if alive, even if the patent is to issue or reissue to an assignee; but where the inventor is dead, the application and oath may be made by the executor or administrator.

Form of Petition for a Patent with Power of Attorney.

To the Commissioner of Patents:

Your petitioner prays that letters-patent may be granted to him for the invention set forth in the annexed specification; and he hereby appoints Munn & Co., of the cities of New York and Washington, D.C., his attorneys, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent-Office connected herewith.

Peter Pendent.

Two or more distinct and separate inventions may not be claimed in one application; but where several inventions are necessarily connected each with the other, they may be so claimed.

The specification must be signed by the inventor, or if deceased, by his executor or administrator, and must be attested by two witnesses. Full names must be given, and all names, whether of applicant or witnesses, must be legibly written.

The Oath of Invention.

The oath of invention should follow the specification. The following is the official form:

State of New York, County of Albany, ss.:

Peter Pendent, the above-named petitioner, being duly sworn, (or affirmed,) deposes and says that he verily believes himself to be the original and first inventor of the improvement in seed-drills described in the foregoing specification; that he does not know and does not believe that the same was ever before known or used; and that he is a citizen of the United States.

Peter Pendent.

Sworn to and subscribed before me this 13th day of March, 1876.

Simon Shallow,
Justice of the Peace.

If the applicant be an alien, the sentence, "and that he is a citizen of the United States," will be omitted, and in lieu thereof will be substituted, "and that he is a citizen of the republic of Mexico," or "and that he is a subject of the King of Italy," or "of the Queen of Great Britain," or as the case may be.

If the applicants claim to be *joint inventors*, the oath will read, "that they verily believe themselves to be the original, first, and joint inventors, etc.

The oath or affirmation may be made before any person within the

United States authorized by law to administer oaths, or, when the applicant resides in a foreign country, before any minister, *chargé d'affaires*, consul, or commercial agent, holding commission under the government of the United States, or before any notary public of the foreign country in which the applicant may be, the oath being attested in all cases, in this and other countries, by the proper official seal of such notary.

The Drawings.

The rules of the Patent-Office in respect to drawings are stringent.

The following rules must be observed :

The paper must be thin Bristol board or thick drawing-paper, with a smooth or calendered surface. The outlines must be executed in deep black lines, to give distinctness to the print. Pale, ashy tints must be dispensed with.

In shading, lines of black ink should be used, and such lines should be distinct and sharp, and not crowded. Brush shadings or shadows will not be permitted.

All colors, except black, must be avoided in the drawing, lettering, and signatures ; violet and purple inks must not be used.

No agent's, attorney's, or other stamp must be placed, in whole or in part, within the margin.

The Model.

A model is required in every case where the nature of the invention admits of such illustration. Such model must clearly exhibit every feature of the machine which forms the subject of a claim of invention.

The model must be neatly and substantially made, of durable material. It should be made as small as possible, but not in any case more than one foot in length, width, or height. If made of pine or other soft wood, it should be painted, stained, or varnished. Glue must not be used, but the parts should be so connected as to resist the action of heat or moisture.

The Official Examination.—No application can be examined, nor can the case be placed upon the files for examination, until the fee is paid, the specification, with the petition and oath, filed, and the drawings and model, or specimen, filed or deposited.

All cases in the Patent Office are classified and taken up for examination in regular order; those in the same class being examined and disposed of, as far as practicable, in the order in which the respective applications are completed. When, however, the invention is deemed of peculiar importance to some branch of the public service, and when, for that reason, the head of some department of the government specially requests immediate action, the case will be taken up out of its order. These, with applications for re-issues, and for letters patent for inventions for which a foreign patent has already been obtained, which cases have precedence over original applications, are the only exceptions to the rule above stated, in relation to the order of examination.

The personal attendance of the applicant at the Patent-Office is unnecessary. The business can be done by correspondence or by attorney.

The Patent-Office will not return specifications for amendment; and in no case will any person be allowed to take any papers, drawings, models, or samples from the office. If applicants have not preserved copies of such papers as they wish to amend, the office will furnish them on the usual terms.

The final fee on issuing a patent must be paid within six months after the time at which the patent was allowed, and notice thereof sent to the applicant or his agent. And if the final fee for such patent be not paid within that time, the patent will be forfeited, and the invention therein described become public property, as against the applicant therefor, unless he shall make a new application therefor within two years from the date of the original allowance.

Appeals.—Every applicant for a patent or the reissue of a patent, any of the claims of which have been twice rejected, and every party to an interference, may appeal from the decision of the primary examiner, or of the examiner in charge of interferences, in such case, to the Board of the Examiner-in-chief, having once paid a fee of ten dollars. For this purpose a petition in writing must be filed, signed by the party, or his authorized agent or attorney, praying an appeal, and setting forth briefly and distinctly the reasons upon which the appeal is taken.

All cases which have been acted on by the Board of Examiners-in-chief may be brought before the Commissioner in person, upon a written request to that effect, and upon the payment of a fee of twenty dollars required by law. A case deliberately decided by one Commissioner will not be disturbed by his successor. The only remaining remedy will be by appeal, in those cases allowed by law, to the Supreme Court of the District of Columbia, sitting in banc.

The mode of appeal from the decision of the office to the Supreme Court of the District of Columbia, is by giving written notice thereof to the Commissioner; said notice being accompanied by the petition addressed to the Supreme Court of the District of Columbia, by reason of appeal, and by a certified copy of all the original papers and evidence in the case. The reasons of appeal must be filed within thirty days after notice of the decision appealed from.

Interferences.—An "interference" is an interlocutory proceeding for the purpose of determining which of two or more persons, each or either of whom claims to be the first inventor of a given device or combination, really made the invention first.

The fact that one of the parties has already obtained a patent will not prevent an interference; for although the Commissioner has no power to cancel a patent already issued, he may, if he finds that another person was the prior inventor, give him also a patent, and thus place them on an equal footing before the courts and the public.

Upon the declaration of an interference, each party will be required, before any time is set for the taking of testimony, to file a statement under oath, giving the date, and a detailed history of the invention; showing the successive experiments, steps of development, extent and character of use, and forms of embodiment. Such statement shall not be open to inspection by the other party until both are filed, or until the time for filing both has expired. In default of such filing by either party, or if the statement of either fails to overcome the *prima-facie* case made by the respective dates of application, or if it shows that the invention has been abandoned, or that it has been in public use for more than two years prior to the application of the affiant, the other party shall be entitled to an adjudication by default upon the case as it stands upon the record.

In cases of interference, parties have the same remedies by appeal as other applicants, to the Examiners-in-chief and to the Commissioner, but no appeal lies, in such cases, from the decision of the Commissioner. Appeals in interference cases should be accompanied with a brief statement of the reasons thereof.

In cases of interference, the party who first filed so much of his application for a patent as illustrates his invention will be deemed the first inventor in the absence of all proof to the contrary. A time will be assigned in which the other party shall complete his direct testimony, and a further time in which the adverse party shall complete the testimony on his side; and a still further time in which both parties may take a rebutting testimony, but shall take no other. If there are more than two parties, the time for taking testimony shall be so arranged, if practicable, that each shall have a like opportunity in his turn, each being held to go forward and prove his case against those who filed their applications before him.

If either party wishes the time for taking his testimony, or for the hearing postponed, he must make application for such postponement, and show

sufficient reason for it by affidavit filed before the time previously appointed has elapsed, if practicable; and must also furnish his opponent with copies of his affidavits, and with reasonable notice of the time of hearing his application.

Reissues.—A reissue is granted to the original patentee, his legal representatives, or the assignees of the entire interest, when by reason of a defective or insufficient specification the original patent is inoperative or invalid, provided the error has arisen from inadvertence, accident or mistake, and without any fraudulent or deceptive intention; but although the patent has been assigned, the application must be made, and the specification sworn to, by the inventor.

The petition for a reissue must show that all parties owning any undivided interest in the patent concur in the surrender. A statement, under oath, of the title of the party proposing to surrender must be filed with the application.

The general rule is, that whatever is really embraced in the original invention, and so described or shown that it might have been embraced in the original patent, may be the subject of a reissue; but no new matter shall be introduced into the specification, nor in case of a machine patent shall the model or drawings be amended, except each by the other; but when there is neither model nor drawing, amendments may be made upon proof satisfactory to the Commissioner, that such new matter or amendment was a part of the original invention, and was omitted from the specification by inadvertence, accident, or mistake, as aforesaid.

Reissued patents expire at the end of the term for which the original patent was granted. For this reason applications for reissue will be acted upon as soon as filed.

A patentee, in reissuing, may at his option have a separate patent for each distinct and separate part of the invention comprehended in his original patent, by paying the required fee in each case, and complying with the other requirements of the law, as in original applications. Each division of a reissue constitutes the subject of a separate specification descriptive of the part or parts of the invention claimed in such division; and the drawing may represent only such part or parts. All the divisions of a reissue will issue simultaneously. If there be controversy as to one, the other will be withheld from issue until the controversy is ended.

In all cases of applications for reissues, the original claim, if reproduced in the amended specification, is subject to re-examination, and may be revised and restricted in the same manner as in original applications; but if any reissue be refused, the original patent will, upon request, be returned to the applicant.

[Note.—The documents required for a reissue are a statement, petition, oath, specification, drawings. The official fee is $30. The attorney's charge, in simple cases, is $30 for preparing and attending to the case. Total ordinary expense, $60.

By means of reissue, a patent may sometimes be divided into several separate patents. Many of the most valuable patents have been several times reissued and subdivided. Where a patent is infringed, and the claims are doubtful or defective, it is common to apply for a reissue with new claims which shall specially meet the infringers.

On making application for reissue, the old or original patent must be surrendered to the Patent-Office, in order that a new patent may be issued in its place. If the original patent has been lost, a certified copy of the patent must be furnished, with an affidavit as to the loss. To enable your attorney to prepare a reissue, the applicant should send to him the original patent, remit as stated, and give a clear statement of the points which he wishes to have corrected.

Assignments.—A patent may be assigned, either as to the whole interest or any undivided part thereof, by any instrument of writing. No particular form of words is necessary to constitute a valid assignment, nor need the instrument be sealed, witnessed, or acknowledged.

A patent, will upon request, issue directly to the assignee or assignees of the entire interest in any invention, or to the inventor and the assignee jointly, when an undivided part only of the entire interest has been conveyed.

In every case where a patent issues or reissues to an assignee, the assignment must be recorded in the Patent-Office at least five days before the issue of the patent, and the specification must be sworn to by the inventor.

Every assignment or grant of an exclusive territorial right must be recorded in the Patent-Office within three months from the execution thereof; otherwise it will be void, as against any subsequent purchaser or mortgagee for a valuable consideration, without notice; but, if recorded after that time, it will protect the assignee or grantee against any such subsequent purchaser, whose assignment or grant is not then on record.

The patentee may convey separate rights under his patent to make or to use or to sell his invention, or he may convey territorial or shop rights which are not exclusive. Such conveyances are mere licenses, and need not be recorded. The receipt of assignments is not generally acknowledged by the office. They will be recorded in their turn within a few days after their reception, and then transmitted to the persons entitled to them.

Forms of Assignments of the Entire Interest in an Invention before the Issue of Letters-patent.—In consideration of one dollar to me paid by Ephraim G. Hall, of Cleveland, Ohio, I do hereby sell and assign to said Ephraim G. Hall all my right, title, and interest in and to a certain invention in ploughs, as fully set forth and described in the specification which I have prepared [if the application has been already made, say "and filed"] preparatory to obtaining letters-patent of the United States therefor. And I do hereby authorize and request the Commissioner of Patents to issue the said letters-patent to the said Ephraim G. Hall, as my assignee, for the sole use and behoof of the said Ephraim G. Hall, and his legal representatives.

Witness my hand this 16th day of February, 1876.

J. F. Crossette.

Of the Entire Interest of Letters-patent.—In consideration of five hundred dollars to me paid by Nathan Wilcox, of Keokuk, Iowa, I do hereby sell and assign to the said Nathan Wilcox all my right, title, and interest in and to the letters-patent of the United States, No. 41,806, for improvement in locomotive head-lights, granted to me July 30th, 1864, the same to be held and enjoyed by the said Nathan Wilcox to the full end of the term for which said letters are granted, as fully and entirely as the same would have been held and enjoyed by me if this assignment and sale had not been made.

Witness my hand this 10th day of June, 1876.

Horace Kimball.

Of an Undivided Interest in the Letters-patent and Extension Thereof.—In consideration of one thousand dollars to me paid by Obadiah N. Bush, of Chicago, Ill., I do hereby sell and assign to the said Obadiah N. Bush one undivided fourth part of all my right, title, and interest in and to the letters-patent of the United States, No. 10,485, for an improvement in cooking-stoves, granted to me May 16th, 1856; the same to be held and enjoyed by the said Obadiah N. Bush to the full end of the term for which said letters-patent are granted, and for the term of any extension thereof, as fully and entirely as the same would have held and enjoyed by me if this assignment and sale had not been made.

Witness my hand this 7th day of January, 1876.

John C. Morris.

Exclusive Territorial Grant by an Assignee.—In consideration of one thousand dollars to me paid by William H. Dinsmore, of Concord, N. H., I do hereby grant and convey to the said William H. Dinsmore the exclu-

sive right to make, use, and vend within the State of Wisconsin, and the counties of Cook and Lake in the State of Illinois, and in no other place or places, the improvement in corn-planters for which letters-patent of the United States, dated August 15th, 1867, were granted by Leverett R. Hull, and by said Hull assigned to me December 3d, 1867, by an assignment duly recorded in liber X^8, p. 416, of the records of the Patent-Office, the same to be held and enjoyed by the said William H. Dinsmore as fully and entirely as the same would have been held and enjoyed by me if this grant had not been made.

Witness my hand this 19th day of March, 1876.

ABRAHAM MOORE.

LICENSE—SHOP RIGHT.—In consideration of fifty dollars to me paid by the firm of Simpson, Jenks & Co., of Huntsville, Ala., I do hereby license and empower the said Simpson, Jenks & Co. to manufacture, at a single foundry and machine shop in said Huntsville, and in no other place or places, the improvement in cotton-seed planters for which letters-patent of the United States, No. 71,846, were granted to me November 13th, 1868, and to sell the machines so manufactured throughout the United States, to the full end of the term for which said letters-patent are granted.

Witness my hand this 22d day of April, 1876.

JOEL NORCROSS

TABLE OF OFFICIAL FEES.

On filing every application for a design, for three years and six months	$10 00
On filing every application for a design, for seven years	15 00
On filing every application for a design, for fourteen years	30 00
On filing every caveat	10 00
On filing every application for a patent	15 00
On issuing each original patent	20 00
On filing a disclaimer	10 00
On filing every application for a division of a reissue	30 00
On filing every application for an extension	50 00
On the grant of every extension	50 00
On filing the first appeal from a primary examiner to examiners-in-chief	10 00
On filing an appeal to the commissioner from examiners-in-chief	20 00
On depositing a trade-mark for registration	25 00
For every copy of a patent or other instrument, for every 100 words	10
For every certified copy of drawing, the cost of having them made.	
For copies of papers not certified, the cost of having them made.	
For recording every assignment of 300 words or under	1 00
For recording every assignment, if over 300 and not over 1000 words	2 00
For recording every assignment, if over 1000 words,	3 00

THE FIRST INQUIRY.—The first inquiry that presents itself to one who has made any improvement or discovery is: "Can I obtain a Patent?" A *positive* answer can only be had by presenting a complete application for a Patent to the Commissioners of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After a season of perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning.

If the parties consulted are honorable men, the inventor may safely confide his ideas to them; they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

A pen-and-ink sketch and a description of the invention should be sent,

together with stamps for return postage. Never mind your inexperience. Nicety of writing or drawing is not essential; all that is needed is to get your idea. Do not use pale ink. Be brief.

CAVEATS.—The filing of a Caveat is oftentimes of great importance, as it may be quickly done, and affords a limited but *immediate protection*. The filing of a Caveat prevents, during its existence, the issue of a patent, without the knowledge of the Caveator, to any other person for a similar device. Should a competitor apply for a patent, the Caveator is notified, and called upon to file in his application for a patent.

A Caveat consists of a Specification, Drawing, Oath, and Petition. To be of any value, these papers should be carefully drawn up. No model is required. When specially desired, they can be ready to send to the applicant, for signature and affidavit, by return mail, or at an hour's notice. The whole expense to file a Caveat is generally $25, of which the official fee is $10, and the agent generally charges $15 to prepare the papers and attend to the business. On the filing the Caveat in Washington the Patent-Office issues an Official Certificate thereof, which is forwarded to the applicant. The existence of a Caveat is an evidence of priority of invention. A Caveat runs for a year, and can be extended from year to year.

Caveats can only be filed by citizens of the United States, and aliens who have resided here one year and have declared their intention to become citizens.

To enable your agent to prepare Caveat-papers, all that is needed is a sketch, drawing, or photograph, and description of the invention, with which remit fees as above. Model not required. All Caveats are secret. No one can see or obtain a copy of a Caveat without the order of the Caveator. The filing of a Caveat does not prevent other persons from making, using, or selling the invention. No exclusive right of sale is secured under a Caveat. Is is only the Patent that secures such a right. All persons are at liberty to use and sell any device until the patent issues. The filing of a Caveat is not an evidence that a Patent will be granted. The Government makes no search as to novelty when a Caveat is filed. No portion of the money paid for a Caveat applies toward the Patent.

HOW TO APPLY FOR A PATENT.—If the invention is simple, the whole cost to apply for a patent is $40,* and when allowed, $20 more are payable, making $60 in all.† The applicant has six months in which to pay the last instalment of $20, after the patent is allowed. If the invention is complicated, the costs are somewhat increased, because the preparation of the drawings and specifications involves extra labor.

Under the Patent laws, all persons, citizens and foreigners, pay the same official fees. There is no distinction as to nationality. Patents are also granted to women and minors; also to the executors or administrators of deceased inventors. The patent is granted for 17 years, during which time the patentee enjoys the full and exclusive right to make, use, and sell the invention, and grant rights, licenses, or privileges.

In order to apply for a patent, all that is necessary is to send a model of the invention to your attorney, by express, prepaid, with an explanation of the merits and working of the invention. Never mind spelling or grammar, but be very particular to give your ideas in full about the invention. Describe its intended working, and mention all the advantages that you can think of. This statement is always of assistance in preparing the specification and drawings. Also remit $15 on account, and give the inventor's full name, middle name included. Drawings and specification will then be prepared and the latter sent to you, with full instructions, for examination and signature.

HOW THE BUSINESS IS DONE.—On the receipt of the model and first

* If a patent is not granted, the applicant loses this cost of making the application.

† Of this sum the first Government fee is $15, the attorney's charges, $25, and the second Government fee is $20, making $60 in all. When an appeal is required, there are additional expenses.

payment of $15, the case is duly registered upon the books of your agents and the application proceeded with as fast as possible. When the documents are ready, they are sent to the inventor by mail, for his examination, signature, and affidavit, with a letter of instruction, etc. The charges for preparing the case are then due and will be called for. On return of the papers the case will be presented to the Patent-Office, and as soon as the patent is allowed, the applicant will be notified to remit the last instalment of the Government fee, namely, $20, and the patent will then be printed and issued.

The average time required to procure a patent is six weeks. They are obtained, however, frequently, in less time ; but in other cases, owing to delay on the part of the officials, the period is sometimes extended to two or three months, and even more.

Appeals.—When the Examiner refuses to allow a patent, and finally rejects the case, the fact is reported to the client, and he is informed as to the probabilities of obtaining a reversal of the Examiner's decision by appeal.

Three appeals are allowed: namely, to the Examiners-in-Chief, to the Commissioner of Patents, to the Supreme Court of the District. The fees and expenses of these appeals are small.

First Appeal.—The government fee payable by the applicant, on making an appeal to the Examiners-in-Chief, is $10. Attorney's charges for preparing and conducting this appeal are very moderate, and in part contingent upon success.

Second Appeal.—From the decision of the Examiners-in-chief an appeal may be taken to the Commissioner of Patents. Government fee, $20.

Third Appeal.—From the decision of the Commissioner of Patents an appeal may be taken to the Supreme Court of the District of Columbia. The applicant pays all the costs.

The Patent-Office does not prepare patent-papers, or make models These must be provided by the applicant or his attorney, according to law, otherwise his claim will not be considered.

The law especially requires that all documents deposited in the Patent-Office shall be correctly, legibly, and clearly written, and that the drawings shall be of a specified size, and executed in an artistic manner.

Models, Remittances, etc.—Persons who apply for patents are by law required to furnish a model, in all cases where the invention can be illustrated or partly illustrated by a model. The model must not exceed twelve inches in any of its dimensions ; it should be neatly made, of hard wood or metal, or other substantial material ; the name of the inventor should be engraved or painted upon it conspicuously. Where the invention consists of an improvement on some known machine, the model only needs to show the working of the improved parts. A representation of the whole machine in the model will not be necessary.

When the invention consists of a new article of manufacture or a new composition, samples of the article must be furnished.

New medicines or medical compounds, and useful mixtures of all kinds, are patentable. Samples must be furnished, and a very minute statement must be made for the exact proportions and ingredients used.

As soon as the model or specimen is ready, it should be placed in the hands of your agent.

If the model does not exceed 12 ounces in weight, it can be sent to your agent by mail.

When sending it away by express always pay the charges on the package.

Simultaneously with the model or specimens, the inventor should remit $15 on account. The money may be forwarded either by express, with the model, or by mail. The safest way to remit is by draft, or by Post-Office order. Always send a letter with the model, and also with the remittance, stating the name and address of the sender.

Design Patents.—The laws for the grant of patents for new designs are of the most liberal and comprehensive character, and their benefits may be enjoyed by all persons, without distinction as to nationality.

Foreign designers and manufacturers who send goods to this country may secure patents here upon their new patterns, and thus prevent other makers from selling similar goods in this market.

A patent for a design may be granted to any person, whether citizen or alien, who, by his own industry, genius, efforts, and expense, has invented or produced any new and original design for a manufacture, bust, statue, alto-relievo, or bas-relief; any new and original design for the printing of woollen, silk, cotton, or other fabrics; any new or original impression, ornament, pattern, print, or picture, to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture; or any new, useful, and original shape or configuration of any article of manufacture, the same not having been known or used by others before his invention or production thereof, or patented or described in any printed publication, upon payment of the duty required by law, and other due proceedings had, the same as in cases of inventions or discoveries.

Patents for designs are granted for a term of three and one half years, or for the term of seven years, or for the term of fourteen years, as the said applicant may elect in his application.

The petition, oath, specification, assignments, and other proceedings in the case of applications for letters-patent for a design are the same as for other patents.

The applicant must furnish either a model or drawings of the design, or photographs or engravings thereof.

The expenses for design patents are as follows:

Patent for three and a half years, whole expense, $25.

Patent for seven years, whole expense, $30.

Patent for fourteen years, whole expense, $45.

The above includes government fees and agents' charges.*

The personal presence of the applicant is not necessary in order to obtain a design patent, as the business can be done by correspondence.

Those who reside at a distance should send their names in full, middle name included, together with twelve photographs of the design not mounted. Also remit the fees as above, by draft, check, or postal order. The petition, oath, and specification will then be prepared and forwarded to the applicant for signature. On their return by him, the papers are filed at the Patent Office, when an official examination is made, and if no conflicting design is found to exist, a patent is issued.

Trade Marks.—Any person or firm domiciled in the United States, and any corporation created by the authority of the United States, or of any State or Territory thereof, and any person, firm, or corporation resident of or located in any foreign country which, by treaty or convention, affords similar privileges to citizens of the United States, and who are entitled to the exclusive use of any lawful trade-mark, or who intend to adopt or use any trade-mark for exclusive use within the United States, may obtain protection for such lawful trade-mark by complying with the official requirements.

Those who desire to secure protection for trade-marks, labels, &c., who live at a distance will please observe the following directions:

1. Send the names of the parties, their residence, and place of business.

2. State the class of merchandize and the particular description of goods in connection with which the trade-mark is to be used.

3. Describe the particular mode in which the trade-mark has been and is intended to be applied and used. For example, for a trade-mark for sheetings, the statement would be, "The trade-mark is to be printed in blue ink, upon the outside of each piece of sheeting." Or, "The trade-mark is

*[The government fee is $10 for three and a half years, $15 for seven years, and $30 for fourteen years. The attorney's charges are $15. When it is inconvenient for applicants to furnish their own drawings or photographs, he will supply them at a reasonable cost.]

to be printed in black, or red, white and blue, upon the exterior of a paper wrapper, which is to cover or extend around each package of the goods."

4. State whether the trade-mark is already in use, and if so, how long it has been used.

5. Send twelve copies of the trade-mark.

Also remit at the same time $40 in full for the expenses, of which $25 are for government fees, and $15 agent's charge.

The necessary petition, declaration, and oath for signature by the applicant, will be prepared and shortly thereafter forwarded to him with the official certificate of protection.

In applying for protection for a trade-mark, a declaration must be made under oath by the applicant or some member of the firm or officer of the corporation, to the effect that the party claiming protection for the trade-mark has a right to the use of the same, and that no other person, firm, or corporation has a right to such use, either in the identical form or having such near resemblance thereto as might be calculated to deceive, and that the description and fac-similes presented for record are true copies of the trade-mark sought to be protected.

Trade-marks remain in force for thirty years, and may be renewed for thirty years more, except in cases where such trade-mark is claimed for, and applied to, articles not manufactured in this country, and in which it receives protection under the laws of any foreign country for a shorter period, in which case it shall cease to have force in this country at the same time that it becomes of no effect elsewhere.

No proposed trade mark will be received or recorded which is not and cannot become a lawful trade-mark, or which is merely the name of a person, firm, or corporation only, unaccompanied by a mark sufficient to distinguish it from the same name when used by other persons, or which is identical with a trade-mark appropriate to the same class of merchandise and belonging to a different owner, and already registered or received for registration, or which so nearly resembles such last-mentioned trade-mark as to be likely to deceive the public; but any lawful trade-mark already lawfully in use may be recorded.

The right to the use of any trade-mark is assignable by any instrument of writing, and such assignment must be recorded in the Patent-Office within sixty days after its execution.

Trade-marks are registered at the Patent-Office in the exact order of their reception, the exact time of receipt being noted and recorded.

Certified copies of any trade-mark may always be obtained.

COPYRIGHTS.—Any citizen or resident of the United States may obtain a copy-right who is the author, inventor, designer, or proprietor of any book, map, chart, dramatic or musical composition, engraving, cut, print, or photograph or negative thereof, or of any painting, drawing, chromo, statue, statuary, and of models and designs, intended to be perfected as works of the fine arts.

A copyright cannot be obtained unless the title or description is recorded in the library of Congress, *before the publication of the work.*

Agents' charge for attending to the business of obtaining a copyright $5, which remit with the title.

If a copyright is desired for a painting, drawing, chromo, statue, statuary, or model or design for a work of art, send a brief description thereof and $5.

Copyrights are granted for the term of twenty-eight years, and may be renewed for fourteen additional years, if the renewal is filed within six months before the expiration of the first term.

Copyrights may be assigned; the assignment must be recorded by the Librarian of Congress.

Infringers of copy-rights are subject to heavy fines and penalties.

Foreigners who are not residents of the United States cannot obtain copyrights; but if residents, they may obtain copyrights.

PATENTS FOR LABELS AND PRINTS.—Labels and prints of all kinds, for bottles, boxes, and packages, for medicines, compounds, and every description of merchandise, may now be patented by registration in the Patent-Office.

In order to obtain such registration, the applicant should forward to his agent his full name, and send *six copies* of the label or print, together with sixteen dollars, which covers all expenses.* On receipt thereof the necessary papers will be prepared and filed in the Patent-Office, and the Official Certificate of Registration forwarded to the applicant. The whole business only occupies a few days' time.

The patent or registration so obtained lasts for twenty-eight years, and may be then renewed for an additional period of fourteen years. It secures to the proprietor the exclusive right to use the registered label or print during the periods named, and all persons who imitate the same will be liable in damages as infringers.

Patents of registration for labels and prints may, like the ordinary patents, be sold either wholly or in part, in state, county, town rights, etc., or subject to royalties.

All licenses, agreements, rights of use, or assignments, must be recorded at Washington within sixty days after the execution of the document.

By the word "*label*," as used in the Act of Congress, is meant a slip or piece of paper, or other material, to be attached in any manner to manufactured articles, or to bottles, boxes, and packages containing them, and bearing an inscription (not a trade-mark), as for example, the name of the manufacturer, or the place of manufacture, the quality of goods, directions for use, etc.

By the word "*print*," as used in the said Act, is meant any device, picture, word or words, figure or figures (not a trade-mark), impressed or stamped directly upon articles of manufacture, to denote the name of the manufacturer, or place of manufacture, style of goods, etc.

But no such print or label can be registered unless it properly belong to an article of commerce, and be as above defined; nor can the same be registered as such print or label when it amounts in law to a technical trade-mark.

GENERAL INFORMATION.—If you wish for *general information* as to the rules and law of infringements, reissues, claims, etc., state your inquiries clearly, and remit $5. Opinions in special cases of infringement cost more.

If you wish for advice in regard to assignments, or upon the rights of parties under assignments, joint ownership in patents, contracts, or licenses, state the points clearly upon which information is wanted, and remit $5.

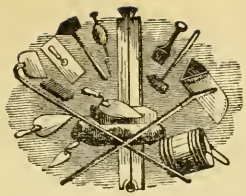
If you desire to know in whose name the title to a Patent is officially recorded at Washington, or if you wish for an abstract of all the deeds of transfer connected with a Patent, send the name of the patentee, date of patent, etc., and remit $5.

If you desire to have an assignment of a Patent, or any share thereof, or license, made out in the proper manner, and placed on record, give the full names of the parties, residences, title of the invention, etc., and remit $5. This includes record fee.

Inventions, or shares thereof, may be assigned either before or after the grant of a patent. Agreements and contracts in regard to invention need to be recorded, like assignments, at Washington. For any agreement or contract that you wish prepared, remit $5.

COPIES OF PATENTS, CLAIMS, ETC.—Copies of specifications or drawings of any existing patent, or open rejected case, official letter, assignment, etc., etc., can readily be furnished. The expense is very moderate, generally not exceeding $1, if the date of the patent is given. Also for $1 a copy of the *claims only* of any existing patent, provided the date or number of the patent is given.

* The Government fee is $6, and the agent's charge is $10.



MASONS, BUILDERS, &c.

Measurements, Estimates of Labor, Mortar, Plaster, Marbles, &c.

Labor on Embankments.—*Single horse and cart.* A horse with a loaded dirt cart employed in excavation and embankment, will make 100 lineal feet, or 200 feet in the distance per minute, while moving. The time lost in loading, dumping, awaiting, etc., = 4 minutes per load. A medium laborer will load a cart in 10 hours, with the following earths, measured in the bank: *Gravelly earth*, 10, *Loam* 12, and *Sandy earth* 14 cubic yards; *carts* are loaded as follows: *Descending hauling*, ⅛ of a cubic yard in bank; *Level hauling*, 2-7 of a cubic yard in bank; *Ascending hauling*, 2-7 of a cubic yard in bank. *Loosening, &c.* In *loam*, a three-horse plough will loosen from 250 to 800 cubic yards per day of 10 hours. The *cost* of loosening earth to be loaded will be from 1 to 8 cents per cubic yard, when wages are 125 cents per day. The cost of trimming and bossing is about 2 cents per cubic yard. *Scooping.* A scoop load will measure 1-10 of a cubic yard, measured in excavation. The time lost in loading, unloading and trimming, per load, is 1⅓ minutes. The time lost for every 70 feet of distance, from excavation to bank, and returning is 1 minute. In *Double Scooping*, the time lost in loading, turning, &c., will be 1 minute; and in *Single Scooping*, it will be 1¾ minutes. (*Ellwood Morris.*)

Hauling Stone.—A cart drawn by horses over an ordinary road will travel 1.1 miles per hour of trip. A 4-horse team will haul from 25 to 36 cubic feet of limestone at each load. The time expended in loading, unloading, &c., including delays, averages 35 minutes per trip. The cost of loading and unloading a cart, using a horse crane at the quarry, and unloading by hand, when labor is $1.25 per day, and a horse 75 cents, is 25 cents per perch = 24.75 cubic feet. The work done by an animal is greatest when the velocity with which he moves is ⅛ of the greatest with which he can move when not impeded, and the force then exerted .45 of the utmost force the animal can exert at a dead pull.

Earth Digging.—*Number of cubic feet of earth in a ton.* Loose earth 24; coarse sand, 18.6. Clay, 18.6 Earth with gravel, 17.8. Clay with gravel, 14.4. Common soil, 15.6. The volume of earth and sand in bank exceeds that in embankment in the following proportions: sand 1-7, clay 1-9, gravel 1-11, and the volume of rock in embankments quarried in large fragments exceeds that in bank fully one-half.

Weight of Earth, Rock, &c.—A cubic yard of sand or ground weighs about 30 cwt.; mud, 25 cwt.; marl, 26 cwt.; clay, 31 cwt.; chalk, 36 cwt.; sandstone, 39 cwt.; shale, 40 cwt.; quartz, 41 cwt.; granite, 42 cwt.; trap, 42 cwt.; slate, 43 cwt.

Fire-proof Houses.—The rendering a dwelling-house fire-proof is a

matter of great importance, furnishing, as it does, the occupant with perfect comfort and security. This precaution is all the more necessary for country dwellings, where a house may be on fire for a long time before any assistance arrives, or any means are found for extinguishing it. The chief means proposed have been iron roofs, floors supported by iron or flat brick arches, plaster or what is called flagging under the flooring-boards, stone or iron staircases, brick or at least brick-nogged partitions, metal sashes, iron plating round all timbers: in short, using metal or brick, and slate, wherever it is possible, instead of wood.

Tiles.—These form a heavier covering for a roof than slates, and are now employed for offices and houses of an inferior class. There are two kinds of tiles in common use, plain tiles and pantiles. Plain tiles are of the same form as slates, but are laid on laths of oak or fir, and bedded and pointed with mortar. The pitch of the roof requires to be forty-five degrees, and the tiles require frequent pointing. Pantiles are curved, and are laid on each other dry: they are seldom used except in cow-houses, sheds, and other outbuildings. They do not form so warm a roof as plain tiles, and are more liable to be deranged. Common tiles are not nearly so durable as slates, being much affected by the frost; but when glazed, as they sometimes are, with a dark glaze, they are very durable. When the red color of tiles is objectionable, they may be covered with a coat of anti-corrosive paint.

Walls.—In the construction of walls, it is essential that the stones be either taken from the quarry, or consist of the largest land-stones, broken in such a manner as to have a good flat surface, in order that they may bind well; that they be built by masons, and well pinned; that they have as dry and deep a foundation as possible in order to guard against frosts, etc.; that they may be made wide at the bottom, and tapering upwards when the coping is to be applied; that the coping consists of materials that cannot be readily overturned or removed, for, upon the manner in which it is finished, much of the future value and durability of the wall will be found to depend. Independently of the ordinary walls of stone, there are others, made of various materials, and constructed in several ways. *Turf walls* form a fence for enclosing fields, and for the formation of folds, pens, or other places of confinement for cattle during the night. In general they are made with turf only, pared off from the adjoining surface, and used without any mixture of earth; in other cases, the wall consists of a fencing of turf on each side, while the space between is filled up with loose earth. *Stone and turf walls* are also very common in many situations, and are frequently employed from necessity, when other materials are expensive or procured with difficulty. *Mud walls with a mixture of straw* are also used. In the construction of these, a small quantity of straw should be taken, and incorporated with a sufficient proportion of clay; the straw in this case, answering the same purpose as hair in lime-plaster; when a sufficient number of small masses are made, the work is begun by laying a stratum at the bottom of the embedded wall; this being done, and the different pieces firmly kneaded together upon the hand, a flat deal board is applied on each side, which, being properly pressed and rubbed against the building in a horizontal direction, not only serves to consolidate the work, but gives it a degree of smoothness and uniformity; successive strata are added, till the wall is raised to the intended height, care being taken to taper it gradually upwards. Walls made in this way will last for many years; and, if washed with lime at the proper season of the year, will have an appearance no way inferior to such as are made with stone and lime. Walls may also be made of rammed earth. In constructing them, the earth is previously pounded, in order to crumble any stones therein; clay is added in a small quantity, about one-eighth part. It is all beaten and mixed up together by repeated blows of the mallet. The earth being thus prepared, and slightly wetted, the foundation of the wall is dug. This is laid with stone; and, when it is about one foot high above the surface of

the ground, planks are arranged on each side, and the space between filled with earth intended for the wall; this method is continued successively until the wall is completed.

How to Build Gravel Houses.—This is the best building material in the world. It is four times cheaper than wood, six times cheaper than stone, and superior to either. Proportions for mixing: to eight barrows of slaked lime, well deluged with water, add 15 barrows of sand; mix these to a creamy consistency, then add 60 barrows of coarse gravel, which must be worked well and completely; you can then throw stones into this mixture, of any shape or size, up to ten inches in diameter. Form moulds for the walls of the house by fixing boards horizontally against upright standards, which must be immovably braced so that they will not yield to the immense pressure outwards as the material settles; set the standards in pairs around the building where the walls are to stand, and from six to eight feet apart, and so wide that the inner space shall form the thickness of the wall. Into the moulds thus formed throw in the concrete material as fast as you choose and the more promiscuously the better. In a short time the gravel will get as hard as the solid rock.

Excellent Cheap Roofing.—Have your roof stiff, rafters made of stuff 1½ by 8 inches, well supported and 6 feet apart, with ribs 1 inch by 2 inches, set edgeways, well nailed to the rafters, about 18 inches apart. The boards may be thin but must be well seasoned, and nailed close together: this done lay down and cover the roof with thin, soft, spongy straw paper used in making paper-boxes, which is sold in rolls and comes very low. Lay in courses up and down the roof, and lap over, nailing down with common No. 6 tacks, with leather under the head like carpet tacks. Then spread on several coatings of the following composition, previously boiled, stirred and mixed together: good clean tar, 8 gals.; Roman cement, 2 gals. (or in its place very fine, clean sand may be used); resin, 5 lbs.; tallow 3 lbs.; apply hot: and let a hand follow, and sift on sharp grit sand, pressing it into the tar composition. If wished fire-proof, go over the above with the following preparation; slake stone lime under cover with hot water till it falls into a fine powder, sift and mix 6 qts. of this with 1 qt. of salt; add 2 gals. water, boil and skim. To 5 gals. of this, add 1 lb. of alum, and 1½ lbs. of copperas, slowly while boiling, 1½ lbs. of potash and 4 qts. of clean, sharp sand, and any color desired. Apply a thick coat with a brush, and you have a roof which no fire can injure from the outside.

CUBIC, OR SOLID MEASURE.

To find the Cubical Contents in a *Stick* of *Timber*, *Block* of *Stone*, *Box*, *Bin*, &c. If all the Dimensions are in Feet, multiply the Length by the Breadth, and this product by the Depth to obtain the number of Cubic Feet.

If the Length is in Feet and the width and depth in inches, multiply the length by the width and this Product by the depth in inches,—then divide the last Product by 144 for the Cubic Feet. If all the Dimensions are in Feet and Inches reduce the whole to Inches, then multiply the Length, Breadth and Depth together, and divide the Product by 1728 to obtain the Cubic Feet.

Required the number of cubic feet in a *box*, *stone*, &c., 4½ feet long, 2½ feet wide and 2 feet deep?

$$4.5 \times 2.5 \times 2 = 22\frac{1}{2} \text{ cubic feet.}$$

To find the capacity of a *bin*, *cistern*, *tanner's vat*, &c., find its (interior) cubic contents in *inches*, by the preceding rules, then if the capacity be required in *gallons*, divide the whole number of inches by 231;—if in bushels, by 2150.42,—or, if in heaped bushels, by 2747.70.

Or, if the interior of a *coal bin* be 4 feet in length, 41 inches in breadth, and 32 inches in depth; then,

$4 \times 41 \times 32 \times .00694 = 36\frac{1}{2}$ cubic feet = 2000 lbs., or 1 ton of Beaver Meadow or Lehigh Coal.

1 Cubic Foot of Peach Mountain Coal, broken or screened for stoves, weighs 54 pounds, and it requires 37 cubic feet of space to stow one ton of 2000 pounds.

Coal is bought at wholesale at the rate of 2240 pounds to the ton, and sold at retail at the rate of 2000 pounds to the ton, *screened*.

Or, if the interior of a *crib* be 6½ feet in length, 3¾ feet in breadth, and 3¼ feet in depth; then,

$6{\cdot}5 \times 3{\cdot}75 \times 3{\cdot}25 \times {\cdot}80356 = 63{\cdot}6522$ (or 63½ bushels and ½ peck.)

The Solid Contents of all bodies, which are of uniform bigness throughout, whatever may be the form of the ends is found by multiplying the area of one end into its height or length.

144 inches equal (=) 1 square foot, (or *area*.)
1728 inches equal (=) 1 cubic foot, (or *solid contents*.)

TABLE.

1728	cubic inches (cu. in.)	make 1 cubic foot	cu. ft.
27	cubic feet	" 1 cubic yard	cu. yd
40	cubic feet of round timber, or	" 1 ton or load	T.
50	" " hewn "		
16	cubic feet	" 1 cord foot	cd. ft.
8	cord feet, or	" 1 cord of wood	Cd.
128	cubic feet		
24¾	cubic feet	" 1 perch of stone or masonry,	Pch.

Scale—ascending, 1728, 27. The other numbers are not in a regular scale, but are merely so many times in 1 foot. The unit equivalents, being fractional, are consequently omitted.

A cubic yard of earth is called a load.

Railroad and transportation companies estimate light freight by the space it occupies in cubic feet, and heavy freight by weight.

A pile of wood 8 feet long, 4 feet wide, and 4 feet high, contains 1 cord; and a cord foot is 1 foot in length of such a pile.

A perch of stone or of masonry is 16½ feet long, 1½ feet wide, and 1 foot high.

Joiners, bricklayers, and masons, make an allowance for windows, doors, etc., of one half the openings or vacant spaces. Bricklayers and masons, in estimating their work by cubic measure, make no allowance for the corners of the walls of houses, cellars, etc., but estimate their work by the *girt*, that is, the entire length of the wall on the *outside*.

Engineers, in making estimates for excavations and embankments, take the dimensions with a line or measure divided into feet and decimals of a foot. The computations are made in feet and decimals, and the results are reduced to cubic yards. In civil engineering, the cubic yard is the unit to which estimates for excavations and embankments are finally reduced.

In scaling or measuring timber for shipping or freighting, 1-5 of the solid contents of round timber is deducted for waste in hewing or sawing. Thus, a log that will make 40 feet of hewn or sawed timber, actually contains 50 cubic feet by measurement; but its market value is only equal to 40 cubic feet of hewn or sawed timber. Hence, the cubic contents of 40 feet of round and 50 feet of hewn timber, as estimated for market, are identical.

MEASUREMENT OF STONE OR BRICK WORK.

1. *Perch, Masons' or Quarrymens' Measure.*

16½ feet long
16 inches wide
12 " high
= 22 cubic feet. To be measured in wall.

$16\frac{1}{2}$ feet long, 18 inches wide, 12 " high } = { 24.75 cubic feet. To be measured in pile.

1 cubic yard = 3 feet × 3 feet × 3 feet = 27 cubic feet. The cubic yard has become the standard for all contract work of late years. Stone walls less than 16 inches thick count as if 16 inches thick to masons; over 16 inches thick, each additional inch is counted.

NUMBER OF BRICKS REQUIRED IN WALL PER SQUARE FOOT FACE OF WALL.

Thickness of wall.		Thickness of wall.	
4 inches	$7\frac{1}{2}$	24 inches	46
8 "	15	28 "	$52\frac{1}{2}$
12 "	$22\frac{1}{2}$	32 "	60
16 "	30	36 "	$67\frac{1}{2}$
20 "	$37\frac{1}{2}$	42 "	75

Cubic yard = 600 bricks in wall.
Perch (22 cubic feet) = 500 bricks in wall.
To pave 1 sq. yard on flat requires 48 bricks.
" " 1 " " edge " 68 "

SQUARE MEASURE.—*Square Measure* is used in measuring *surfaces*, or things whose *length* and *breadth* are considered without regard to *height* or *depth;* as land, flooring, plastering, &c. Its denominations are *acres, roods, square rods, square yards, square feet*, and *square inches*.

144 square inches (*sq.in.*)	make	1 square foot,	marked *sq. ft.*
9 square feet	"	1 square yard,	" *sq. yd.*
$30\frac{1}{4}$ square yards, or $272\frac{1}{4}$ square feet	"	1 square rod,	" *sq. r.*
40 square rods	"	1 rood,	" *R.*
4 roods, or 160 square rods	"	1 acre,	" *A.*
640 acres	"	1 square mile,	" *M.*

Note.—16 square rods make one square chain; 10 square chains, or 100,000 square links, make an acre. Flooring, roofing, plastering, &c., are frequently estimated by the "square," which contains 100 square feet.

MORTAR, PLASTER, &C.—22 KINDS.—1. *Stone Mortar.*—Cement, 8 parts; lime, 3 parts; sand, 31 parts. *Mortar.*—Lime, 1 part; sharp, clean sand, $2\frac{1}{2}$ parts. An excess of water in slaking the lime swells the mortar, which remains light and porous, or shrinks in drying: an excess of sand destroys the cohesive properties of the mass. 3. *Brown Mortar.*—Lime, 1 part; sand, 2 parts; and a small quantity of hair. 4. *Brick Mortar.*—Cement, 3 parts; lime, three parts; sand, 27 parts. Lime and sand, and cement and sand, lessen about $\frac{1}{3}$ in volume when mixed together. 5. *Turkish Mortar.*—Powdered brick and tiles, 1 part; fine sifted lime, 2 parts; mix to a proper consistency with water, and lay on layers of 5 or 6 inches thick between the courses of brick or stone. Very useful on massive or very solid buildings. 6. *Interior plastering—Coarse Stuff.*—Common lime mortar as made for brick masonry, with a small quantity of hair; or by volumes, lime paste (30 lbs. lime), 1 part; sand, 2 to $2\frac{1}{4}$ parts; hair, $\frac{1}{6}$ part. When full time for hardening cannot be allowed, substitute from 15 to 20 *per cent.* of the lime by an equal portion of hydraulic cement. For the second or *brown* coat the proportion of hair may be slightly diminished. 7. *Fine Stuff.*—(Lime putty): Lump lime slacked to a paste with a moderate volume of water, and afterwards diluted to the consistency of cream, and then hardened by evaporation to the required consistency for working. In this state it is

used as a *slipped coat*, and when mixed with sand or plaster of Paris, it is used for the *finishing coat*. 8. *Gauge Stuff or Hard Finish* is composed of 3 or 4 volumes of fine stuff and 1 volume of plaster of Paris, in proportion regulated by the degree of rapidity required in hardening for cornices, &c., the proportions are equal volumes of each, fine stuff and plaster. 9. *Stucco* is composed of from 3 to 4 volumes of white sand to 1 volume of fine stuff or lime putty. 10. *Scratch Coat.*—The first of 3 coats when laid upon laths, and is from $\frac{3}{8}$ to $\frac{1}{4}$ of an inch thickness. 11. *One Coat Work.*—Plastering in 1 coat without finish either on masonry or laths that is rendered or laid. Work on well. 12. *Two Coat Work.*—Plastering in 2 coats is done either in a *laying coat and set*, or in a *screed coat and set*. The *screed coat* is also termed a *Floated Coat*. *Laying* the first coat in two coat work is resorted to in common work instead of *screeding*, when the finished surface is not required to be exact to a straight edge. It is laid in a coat of about $\frac{1}{2}$ inch in thickness. The laying coat, except for very common work, should be *hand floated*, as the tenacity and firmness of the work is much increased thereby. *Screeds* are strips of mortar 26 to 28 inches in width, and of the required thickness of the first coat, applied to the angles of a room, or edge of a wall and parallelly, at intervals of 3 to 5 feet over the surface to be covered. When these have become sufficiently hard to withstand the pressure of a straight edge, the interspaces between the screeds should be filled out flush with them, so as to produce a continuous and straight even surface. *Slipped Coat* is the smoothing off of a brown coat with a small quantity of lime putty, mixed with three per cent. of white sand so as to make a comparatively even surface. This finish answers when the surface is to be finished in distemper of paper. *Hard Finish:* Fine stuff applied with a trowel to the depth of about $\frac{1}{3}$ of an inch. 13. *Cement for External Use.*—Ashes, 2 parts; clay, 3 parts; sand, 1 part; mix with a little oil. Very durable. 13. *Composition for Streets and Roads.*—Bitumen, 16.875 parts: asphaltum, 2.25 parts; oil of resin, 6.25; sand, 1.35 parts. Thickness from $1\frac{5}{8}$ to $1\frac{1}{4}$ inches. Asphaltum, 55 lbs., and gravel 28.7 lbs. will cover an area of 10.75 square feet. 15. *Asphalte Composition.*— Mineral pitch, 1 part; bitumen, 11 parts; powdered stone or wood ashes, 7 parts. 16. *Asphalte Mastic* is composed of nearly pure carbonate of lime and about 9 or 10 per cent. of bitumen or mineral pitch. The powdered asphalte is mixed with the bitumen in a melted state along with clean gravel and consistency is given to pour it into moulds. The asphalte is ductile, and has elasticity to enable it, with the small stones sifted upon it, to resist ordinary wear. Sun and rain do not affect it, wear and tear do not seem to injure it. The pedestrian in many cities in the United States and Canada, can readily detect its presence on the sidewalk by its peculiar yielding to the foot as he steps over it. It is also a most excellent roofing material when rightly applied, it being on record in France that a stout roof of this material withstood the accidental fall of a stack of chimneys, with the only effect of bruising the mastic, readily repaired. 17. *Asphalte for Walks.*— Take 2 parts very fine, dry, lime rubbish, and 1 part coal ashes, also very dry, all sifted fine. In a dry place, on a dry day, mix them, and leave a hole in the middle of the heap, as bricklayers do when they make mortar. Into this pour boiling hot coal tar; mix and when as stiff as mortar, put it three inches thick where the walk is to be; the ground should be dry and beaten smooth; sprinkle over it coarse sand. When cold pass a light roller over it; in a few days the walk will be solid and waterproof. 18. *Mastic Cement for Covering the Fronts of Houses.*—Fifty parts, by measure, of clean dry sand, 50 of limestone (not burned) reduced to grains like sand or marble dust, and 10 parts red lead, mixed with as much boiled linseed oil as will make it slightly moist. The bricks to receive it, should be covered with three coats of boiled oil, laid on with a brush, and suffered to dry before the mastic is put on. It is laid on with a trowel like plaster, but it must not be so moist. It becomes hard as a stone in a few months. Care must be exercised not to use too much oil. 19. *Cement for Tile-Roofs.*

—Equal parts of whiting and dry sand, and 25 per cent. of litharge, made into the consistency of putty with linseed oil. It is not liable to crack when cold, nor melt like coal-tar and asphalte, with the heat of the sun. 20. *Cement for Outside of Brick Walls.*—Cement for the outside of brick walls, to imitate stone, is made of clean sand, 90 parts; litharge, 5 parts; plaster of Paris, 5 parts; moistened with boiled linseed oil. The bricks should receive two or three coats of oil before the cement is applied. 21. *Water Lime at Fifty Cents per Barrel.*—Fine clean sand, 100 lbs.; quick-lime in powder, 28 lbs.; bone ashes, 24 lbs.; for use, beat up with water, and use as quick as possible. 22. *Cement for Seams in Roofs.*—Take equal quantities of white lead and white sand, and as much oil as will make it into the consistency of putty. It will in a few weeks become as hard as stone.

ESTIMATE OF MATERIALS AND LABOR FOR 100 SQUARE YARDS OF LATH AND PLASTER.

Materials, and Labor.	Three coats hard finish.	Two Coats Slipped.	Materials, and Labor.	Three coats hard finish.	Two coats Slipped.
Lime . . .	4 Casks.	3½ casks.	White Sand	2½ bushs.	
Lump Lime	⅔ "		Nails . . .	13 lbs.	13 lbs.
Plaster of			Masons . .	4 days.	3½ days.
Paris . .	⅓ "		Laborer . .	3 "	2 "
Laths . . .	2000	2000	Cartage . .	1 "	¾ "
Hair . . .	4 bushs.	3 bushs.			
Sand . . .	6 loads.	6 loads.			

VARNISH FOR PLASTER CASTS.—White soap and white wax, each ½ oz., water, 2 pts., boil together in a clean vessel for a short time. This varnish is to be applied when cold with a soft brush.

THE BRONZING OF PLASTER CASTS is effected by giving them a coat of oil or size varnish, and when this is nearly dry, applying with a dabber of cotton or a camel-hair pencil any of the metallic bronze powders; or the powder may be placed in a little bag of muslin, and dusted over the surface, and afterwards finished with a wad of linen. The surface must be afterwards varnished.

SUBSTITUTE FOR PLASTER OF PARIS.—Best whiting, 2 lbs.; glue, 1 lb.; linseed oil, 1 lb. Heat all together, and stir thoroughly. Let the compound cool, and then lay it on a stone covered with powdered whiting, and heat it well till it becomes of a tough and firm consistence; then put it by for use, covering with wet cloths to keep it fresh. When wanted for use, it must be cut in pieces adapted to the size of the mould, into which it is forced by a screw press. The ornament may be fixed to the wall, picture-frame, etc., with glue or white lead. It becomes in time as hard as stone itself.

MODELLING CLAY.—Knead dry clay with glycerine instead of water, and a mass is obtained which remains moist and plastic for a considerable time, being a great convenience to the modeller.

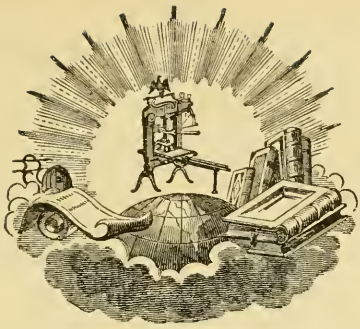
TO POLISH PLASTER OF PARIS WORK.—The addition of 1 or 2 per cent. of many salts, such as alum, sulphate of potash, or borax, confers upon gypsum the property of setting slowly in a mass capable of receiving a very high polish.

TO MAKE PLASTER OF PARIS AS HARD AS MARBLE.—The plaster is put in a drum, turning horizontally on its axis, and steam admitted from a steam boiler: by this means the plaster is made to absorb in a short space of time the desired quantity of moisture, which can be regulated with

great precision. The plaster thus prepared is filled into suitable moulds; and the whole submitted to the action of an hydraulic press; when taken out of the moulds, the articles are ready for use, and will be found as hard as marble, and will take a polish like it.

To Take a Plaster of Paris Cast from a Person's Face.—The person must lie on his back, and his hair be tied behind; into each nostril put a conical piece of paper, open at each end, to allow of breathing. The face is to be lightly oiled over, and the plaster being properly prepared, is to be poured over the face, taking particular care that the eyes are shut till it is a quarter of an inch thick. In a few minutes the plaster may be removed. In this a mould is to be formed, from which a second cast is to be taken, that will furnish casts exactly like the original.

Fire-proof Boxes, Closets, &c.—The principle upon which these should be constructed is, that they should be made of such materials as are not only incombustible, but as little as possible capable of being heated. Metals are not combustible by ordinary fires; but, as they are susceptible of being made extremely hot, they are not proper for this purpose. If the joints are not perfectly close, so as to exclude the external air, papers and other inflammable substances will be burnt and consumed in them in case of a fire; and even should the joints fit quite tightly, papers in them will at least be charred and rendered useless. Brick, soft stone, layers of pumice, charcoal, and other porous substances, are the best non-conductors of heat. Fire-proof boxes should, therefore, be constructed of these materials which may be cased with sheet iron, merely to keep them together. Air is a good non-conductor; therefore two boxes of non-conducting materials, with a space of a few inches between them, will be far safer than any single box. The inner box should rest upon pieces of pumice, and should not touch the external one anywhere; or the space between the two boxes should be filled with pumice.



PRINTING AND BOOKBINDING.

How to use Ink, the Amount Required for Different Kinds of Work, Mixing Colors, Rollers, Marbling Books, &c.

If it were possible to contract for work, with permit to charge specifically for such ink as would be used, it would be of advantage to the printer. This, however, is not the usual course. The printer's estimate must be fixed, and must include both labor and ink.

It is difficult to make such estimate with justice. Even those who have had large experience in the use of colored inks, and who have kept and consulted written records of the value of ink used on previous jobs, often find themselves at fault in estimating.

There is great difference in inks of apparently the same quality and at the same price. Some colored inks contain much more color than others. If judiciously used, these full-bodied inks will give much more service than thin-bodied inks.

The temperature affects the service of colors. On poster or flat-tint work, one pound of red ink in summer will cover as much surface as one and-a half pounds in winter. A warm atmosphere softens the varnish, and allows the ink to be spread in a thin and even film over the type. Cold weather stiffens the varnish, makes it more difficult to distribute, and compels the pressman to use it in larger quantity.

The quality of paper has a very marked influence. A thick, spongy or pulpy paper will imbibe ink greedily. A dry rough-faced News does not imbibe it, but the ink must either be piled on or forced in the paper. It will require from one-fourth to one-half more than a smooth calendered paper. Straw paper, of fair make and smooth face, is well adapted for economical consumption of ink. It absorbs color less than any other quality of ordinary printing. Dry paper will use more color than damp paper, but a really wet or over-damped paper will absorb more than either. The most favorable quality for a small consumption of ink is a smooth sized and calendered sheet, slightly dampened.

The length of the edition will vary the amount of ink used. One pound of carmine ink may be barely sufficient to print 1000 impressions on a show card. A large portion of the color will be unavoidably wasted in the can

and in charging the fountain. But an order of 5000 could be done with three and a half pounds, possibly with three pounds, for the greatest waste is chiefly on the first 1000 impressions.

The pressman's method of work has much to do with saving or waste of color. If he uses soft rollers, and makes ready with a light spongy impression against fine blanket or rubber cloth, he will use much more color than a pressman who prefers moderately firm rollers, and makes ready against a hard surface, with firm impression. If the pressman washes his rollers too frequently, or if he does not protect his ink and ink fountains from dirt and dust, he may waste nearly as much color as he uses.

The quantity of color required is often a matter of taste. One pressman will merely stain the paper, considering the presswork bad, if every hair-line is not thin, sharp and weak, almost to illegibility; while another, aiming at brilliant effect and decided contrast, will use an excess of ink, regardless of thick hair-lines, if he can preserve a solid and even color on the body marks of the letter.

The surface inked will produce the greatest variation in amount of color. A small margined duodecimo in solid bold-faced type, will use three times the ink of a double-leaded octavo in light-faced type. An ordinary poster will use ten times the ink of any book form; a flat surfaced tint block, with few white lines, will use twice as much as any poster. This rapid increase in consumption of color, with the increase of surface inked, is always surprising to the novice, and is often the cause of many losses.

The price at which ink is sold does not always indicate its value. Special inks are made for special purposes, for which purposes they are cheap and efficient, and outside of which they are both expensive and unsatisfactory. Ink made for job work on dry paper is not economical when used for book work on damp paper. The value of ink must be determined quite as much by its extending and covering capacity as by its nominal price. The finest black is the strongest of all colors, and although it is sold from $2.00 to $5.00 per pound, it is not an expensive color, when used for open type work. It is very bulky for its weight; the coloring matter in it is exceedingly light, and this color is mixed with as little varnish as is possible. The color is also better, it has more extending capacity, is more finely ground, wastes less and works cleaner than a cheap ink. But when such expensive ink is used on very solid black work, little or nothing is saved by its superior extending properties.

In hazarding estimates on work, the following observations on the probable value of ink will be of service. But they should not be accepted as applicable to all cases. Differences in quality of inks, in the paper, the temperature, and the method of pressmen, must make variations in result.

Black Inks.—On common news and rough book work, the value of black ink at 40 cents, used and wasted in printing a wet-down sheet of size 24 × 38 inches, or thereabouts, is a little less than 17 cents per 1000 impressions, or about 4 cents* a token of 250 impressions. If the sheet is over-colored, it will cost 6 cents; if it is under-colored, or if printed on damp calendered paper, (an unusual quality of this class of work), it will not cost 3 cents per token.

For ordinary book work, using ink at 60 cents, on smooth paper of size 24 × 38 inches, the average cost of ink used and wasted will be about 6 cents per token; on dry and rough paper, it will reach 10 or 13 cents.

Fine book or pamphlet Presswork on damp sheets of calendered paper, of size 24 × 38, using ink at $1.00, should have its average value rated at 10 cents per token for an ordinary edition. Upon a short edition, for which ink is specially put in the fountain, and of which much is wasted, the cost will be

* It is a popular belief that the ink used for this class of work, on this size, does not exceed 3 cents per token. This is the ordinary reckoning, which is for use only. But the waste of this quality of ink is rarely ever less than one-fifth, and it often approximates more closely to one-third of the amount purchased.

from 15 to 25 cents per token. If the paper is a soft and spongy Book, cost for either quantity will be still higher.

Illustrated Catalogues, printed on medium sheets, 19 × 24 inches, on dry calendered paper, with cuts of large size and blackness, will use of wood-cut ink at $2.50 per pound, on an edition of 1000, at the rate of 60 cents to $1.00 per token. If the edition is of 5000 impressions, the value of ink used will range from 40 cents to 70 cents per token. If cuts are very large or black, they may consume ink, on an edition of 1000 copies, at the rate of $1.50 per token. If ink at $3.00 or $5.00 is used, in place of ink at $2.50, the price will increase, but not in true proportion—the more expensive color is finer, and has more extending capacity. These are prices for cuts of machinery. The amount of color on this work is largely under the control of the pressman. He can use it freely or sparingly, at will, but with a corresponding effect of strength or weakness in the work.

Book Illustrations. The ordinary illustrations of books and newspapers, when not too frequent, or too black, do not sensibly increase the consumption of ink. It is not usual to make account of the value of ordinary ink on this class of work. But when the cuts are numerous and are black, and fine inks are used, the value of color used cannot be overlooked. On a large edition of work of this class, the average value of ink at $2.00, on a sheet 24 × 38 inches, will be 50 cents per token. Upon an edition of 1000, the cost of the same ink would be more than $1.00 per token. A Double Royal sheet 29 × 43 inches, on an edition of 20,000, with ink at $3.00, with many cuts, has been worked at a cost of 53 cents per token for ink; but this is a rare result, the economy being due as much to the skill of the pressman as to the length of the edition. If the edition had been 1000, the value of the black ink used and wasted would have been at the rate of $1.50 per token.

Posters. An ordinary poster, 12 × 19 inches, will consume of black ink at 25 cents per pound, at the rate of 30 and 40 cents per 1000 impressions, the quantity used depending upon the size of the type and the quality of the paper. Under the same conditions, a poster 19 × 24 inches, will consume black ink of same quality at the rate of 75 cents and $1.00 per 1000 impressions; a poster 24 × 38 inches, from $1.25 to $2.00 per 1000 impressions. The value of the color used increases with the size of the sheet, and for this work, in greater proportion. The larger form has larger type, and the larger press wastes more color.

Tint Blocks. A solid tint Block cut on pine, for a sheet 24 × 38 inches, with a few white lines, will use of 25 cent ink, at the rate of $3.00 per 1000 impressions. If finer inks are used, the advance in price will be nearly in strict proportion. For a sheet 24 × 38, of smooth, thick paper, dry, printed on a metal tint-plate, with ink at $1.00 per pound, the cost of ink will be $10.00 per 1000 impressions. For this class of work, a pound of fine ink will do more work than a pound of cheap ink. On common flat work, a good black ink will permit a liberal reduction of body with varnish.

Blue Inks.—Many qualities of this color are used. The leading varieties are best known to printers as light, dark, ultramarine and bronze blues. The light has a limited use for flat surfaces and tints; the ultramarine, for flat surfaces, tints, posters, and to some extent, in its finer qualities, on fine type; the dark and bronze blues are most used for fine and light work, for which they are well adapted, having strong body, and in extending property being nearly equal to fine black ink.

Ultramarine is the favorite color for bright showy work. It is very bulky for its weight, and works well upon all flat surfaces. It is not a finely-ground color. The best colors only are used for type, but they do not work with the freedom and smoothness of dark or bronze blues. The prices range from 50 to $3.00 per pound.

Flat Surfaces. A flat-faced label, 9 × 14 inches, will consume of pure ultramarine blue at $1.00 per pound at the rate of $3.00 per 1000 impressions. A flat tint block, 18 × 22 inches, on fair paper, will use of this color, when somewhat reduced with varnish, at the rate of $9.00 per 1000 impressions.

A flat tint block of pine wood, made for paper 24 × 38 inches, will use of ultramarine at 75 cents, largely reduced with varnish, at the rate of $15.00 per 1000 impressions.

Posters. For a poster, 12 × 19 inches, on ordinary News, the value used of ultramarine ink at $1.00 will be at the rate of $2.00 per 1000 impressions; for a poster, 19 × 24 inches, on ultramarine blue at 75 cents, $3.50 per 1000 impressions; for a poster, 24 × 38 inches, on ultramarine blue at 75 cents, at the rate of $6.00 to $8.00 per 1000 impressions. Ink at 50 cents per pound would diminish the value of the color used, but not in ratio with the reduced price. The cheaper color is thinner, not so well ground, and is consumed more freely. If it is used on any but the largest type, it will not prove of marked economy.

Dark blue and bronze blue are little used for posters or flat tints. If used in bulk, without reducing, they will be much more expensive than ultramarine. When used on this kind of work, they are usually thinned with white ink, varnish, turpentine, benzine, etc., and sometimes with magnesia. When used on light, open and fine work, the value of dark or bronze blues, may be rated as about double that of the same quality as black ink.

Red Inks. Under this heading may be classified many qualities of scarlet and crimson color. The leading qualities are vermilion, lake and carmine.

Vermilion red, a pure scarlet, is the basis of the better qualities of the cheap reds in greatest use. Commoner qualities, such as are sold at 75 cents and $1.00 per pound, are largely mixed with cheaper colors. In its pure state, vermilion is the densest, and, in extending property, the weakest of all colors. A pound of vermilion red at $3.00 per pound is about half the bulk of fine black at $1.00 per pound. Where the black will yield color for 1000 impressions, the vermilion red will be used-up with about 350 impressions. The value of the red color, extending capacity considered, is about ten times as great as that of fine black.

Lake red, a deep crimson, is inferior to black in extension, but will give treble the service of ordinary vermilion. It is too expensive for most bold work, or for flat surfaces, nor does it produce as good an effect as pure vermilion. It is largely used for fine work, for which it is well fitted.

Carmine, an intense and glowing crimson, is but little inferior to the finest black in extending properties. It is one of the most expensive colors, and can be used to profit and with effect only on light and open work. For flat and solid work, the effect produced is but little superior to that of the finer lakes, and is seldom worth the extra cost.

Posters.—The value of red ink at $1.00 per pound, that will be used and wasted in printing 1000 posters, 12 × 19 inches, may be rated at $3.00; on 1000 posters 19 × 24 inches, the value of color may be estimated at $5.00 and $6.00 per 1000; on a poster, 24 × 38 inches, at $9.00 and $12.00 per 1000. The color is weak, and the use of light or bold-faced type will make serious differences in the consumption of color. On double medium posters, the value of the color may be averaged at $1.00 per 100 impressions.

Flat Surfaces. A flat label 9 × 14 inches, with ordinary amount and size of lettering cut for white, such as is used for soap boxes, etc., will consume of pure red ink at $1.00 per pound, at the rate of $4.50 and $5.00 per 1000 impressions. If the plate is flat, without lettering, at the rate of $6.00 per 1000 impressions. A flat tint poster for paper 19 × 24 inches, with letters cut in white as above, will use of red ink at $1.00 per pound, that has been somewhat thinned with varnish, at the rate of $9.00 and $10.00 per 1000 impressions. If pure color is used, it will consume color to the amount of $14.00 or $15.00. A flat tint poster for paper 24 × 38 inches, cut on pine, with lettering as above, will consume of red ink at $1.00 per pound, thinned with varnish, at the rate of $18.00 and $25.00 per 1000 impressions. If dry paper is used, as is necessary for registered work it could not be rated at less than $20.00; for damp paper, carefully managed, it may be less than $18.00, but this is unusual.

All these estimates for colors must be used with discretion. Much will depend upon the workman. A neat and capable pressman, who has experience in use of colors and who knows when and how to dilute color to advantage, can do work at somewhat less cost than is here stated; a careless or inexpert pressman will use much more ink than is here allowed.

Black, red and blue are the colors in greatest request, and the only ones probably that need remarks on their extending properties. Some observations on other colors may be of service.

Yellow is used chiefly for shades, tints, and picture work, or as a mixing color to lighten the tones of dark greens or browns. As a shade for blacks it is quite effective. It is too feeble a color to be used unsupported, as the body color for type work. As a flat tint, it will bear much extension without deterioration, and for this purpose may be considered an economical color.

Brown is made in great variety of shades, and of very unequal value. Upon fine type, the cheaper qualities of brown do not work freely, and they give much trouble to the pressman. A really fine bright or deep brown that will work freely is an expensive color. An estimate made for such color should be the same as for fine lake red.

Green is made in many shades, most of which are sold at moderate prices. The pea green and apple green are weak colors, and require an unusual quantity of Ink to produce the proper effect. The dark greens are colors of good extending properties, and of great permanency.

Aniline Colors.—Within a few years many new colors of exceeding beauty and brilliancy have been introduced, which are known as aniline colors. They comprise many varieties of color, the most popular of which are intense purple, claret, and pink. They work freely and smoothly, and even surpass carmine in extending properties. But they lack permanency. All aniline colors, so far as the writer's experience extends, are fugitive, and fade readily on exposure to light. For elegant and ephemeral work, like ball tickets, notices and circulars, they are of great service. But they should never be used on any job that will receive much exposure to light, like a show card, or on notes, stock certificates, or work that may be preserved for months or years. Nor should they be used to make tint colors.

Purple made of carmine and blue is not so bright, but is more durable than the aniline purple. But all purples are transitory colors; where they do not fade, they soon lose their brilliancy.

White Inks are used almost exclusively for making tints. For common work, the lower grades may be used; for fine or even ordinary good work, it will be found most economical to use that sold at the highest price.

The mixing of colors, to produce another color or a variation in tint, should be done with great caution, and only in small quantities, until the right effect is produced. Some colors are pure minerals, some are vegetable extracts, and some are composed of animal matter; some are mixed with one kind of oil or varnish; some are mixed with an entirely different substance; and some are entirely devoid of all oil or varnish. To produce the needed qualities, ink makers find it necessary to use a great variety of chemicals. That which is essential to one color is destructive to another. Whoever undertakes to mix inks together without a knowledge of their constituents, is liable to mix incompatible substances. When these constituents have a mutual antipathy either the color will be spoiled, or the mixture will work badly on the rollers and type.

In mixing tints, of which the body is white ink, the tinting color should be added to the white, and gradually increased until the mixture is of satisfactory shade. If white is added to the tinting color, by an inexpert, it is more than probable that an unnecessary amount will be mixed, and much good color spoiled. Very little dark color is needed to tint white.

To use bright colors with economy, absolute cleanliness is of the first importance. The form, the rollers and the distributing table must be so free

from ink and dust, that they will not soil soft white paper, which should be used as a test before applying fine color. On fine work, the merest trifle of black or dark ink will dim the brightness of any light color, while a badly washed roller or dirty form will change the color completely.

On all flat surfaces, ink must be thinned to secure freedom of working, as well as economy. Varnish, boiled oil, turpentine, benzine and magnesia, are used for this purpose. Pressmen of experience can apply these materials to extend the color with economy, and without injury to the work. Those who are inexpert should use them with great caution. An ounce too much of any of these materials may spoil a pound of color.

Estimates cannot be given for the amount of color used on show cards with flat tints. When great depth and brilliancy of color is wanted, it is often necessary to use extra colors, and sometimes the tint is printed twice in same or similar color, one color over the other, after the first color is dry.

Printing in colors is really but a method of painting. When a color is weak, one coat of paint will not produce the effect. Carriage or cabinet work is always treated with many coats of color or varnish. This usage can be imitated to some extent with marked success and economy in printing bright colors. Feeble colors, like pale greens or pale vermilions, when printed twice show a softness and smoothness that can be secured in no other way. On rich and bright colors, the effect is sometimes as good as that of the best flock or velvet work. For the first coat of color a cheaper ink may be used. Pale vermilion over orange red is of better effect than two printings of vermilion; carmine over deep vermilion is better than two printings of carmine. When such methods are used, more than double price must be charged. The work is unavoidably tedious, and superior presses of infallible accuracy of register are indispensable.

Too frequent washing up of rollers wastes ink seriously. Color should not be laid on until everything is clean, and should be added with great caution until the right tone is secured.

Presswork in colored inks must always be at higher price than in black. There are two kinds of colored ink in which the amount of color used is trivial, and the cost per pound of the bright color is the same as that of black. But the covering capacity of the bright color is usually much less, so that its actual cost is really more.

The cost of the color is not the only consideration that should determine the price. Black ink is the standard color, with which all press fountains are filled. To use bright color, it is necessary to change the ink in the fountain, and to cleanse all the rollers. This takes time and adds to the expense, which expense should be assessed upon the work. Request is sometimes made, on tinted envelopes and similar work, for a variety of tints. Every added color should consequently be at extra price.

Ink of bright color requires newer and better rollers than black. On really fine work, the rollers are rapidly destroyed. When a press carries six or more rollers, this rapid waste is a serious extra expense. If they are a trifle too hard, or too soft—faults that could be corrected or overlooked on black—they cannot be used for colors.

Colored inks usually compel the press to run at slower speed. There are kinds that work as smoothly as black, but they are exceptions. Some of the brightest and best colors are apt to clog the type and rollers, and require frequent washing up. If really fine work or good colors are desired, a diminished speed for the press should always be considered in making an estimate for presswork in colors.

Where much colored work is done, there should be a separate ink fountain for every decided color—one each for black, red, blue and yellow. There should also be separate cloth distributing rollers for each of these colors. By much waste of labor, it is possible to clean up a black ink fountain to serve for red, but it is quite impossible to clean a cloth roller that has been used for black, so that it will serve for red.

Small orders and light-faced forms may be printed with economy, by feeding on the ink with a palette knife or a brayer, but it is difficult to maintain uniformity in color. For long editions, the ink will be used with more economy, and with better result, if it is fed from the fountain.

The old method of pricing colored presswork was to charge double price for all colored ink, and treble price for bronze. As colors are better made now, and give less trouble, this rule cannot be considered as absolute in its application. Where the colors are cheap and easy working and the form is small and of light-faced type, an addition of one-half to the price of black work of the same class will be sufficient. In a few rare cases, one-fourth extra is enough. Where the form is full of bold type, as on a poster, double price may be insufficient.

Work in Bronze should be rated at about three times the price of black of the same class. The ordinary quality of bronze is not expensive, but the mere labor of applying it, and of the subsequent dusting and pressing of the sheets, is at least as great as that required for presswork in black. When bronze is used in quantity, treble price is not enough.

Dry Color Work should be at least four times the price of black presswork of the same class. It is a disagreeable method of printing.

Crystal or Spangled Work should be from six to eight times the price of black.

Flock Work should be about five times the price of black.

Every printer should keep a record of the time spent, and the value of ink consumed on every job of importance, with such explanatory memoranda as may be needed. Such a record will be of service in making subsequent estimates for work of like nature.

The making of colored inks by printers is not to be recommended. The apparently favorable results are always delusive. Ink-making is both a trade and an art, and one in which the novice has to pay dearly for his experience. Those printers who have experimented most in this direction, and who know most about it, do not make, but buy their inks.*

Printers' Rollers.—*No.* 1, *Black Composition,* very durable and elastic. Genuine Irish or Buffalo glue, 10½ lbs.; black sugar cane, or best maple molasses, 1 gal.; purified India rubber shavings, 1 lb.; Carolina tar, 2 ozs.; glycerine, 12 ozs.; strong vinegar, 4 ozs. Soak the glue over night and drain in the morning by means of a *covered* colander. Boil molasses and skim for 20 minutes. Add the rubber shavings and stir until it combines with the molasses, add the glue and boil 6 or 7 minutes, and pour. If purified rubber cannot be procured add 1½ lbs. more glue and 4 ozs. more glycerine. No. 1 glue, 2 lbs.; Baeder's glue, 2 lbs.; best sugar house molasses, 1 gal.; glycerine, ½ pint. For *Winter* use, reduce each glue ¼ to ⅜ of a lb. Soak the glues wrapped up separately in woollen cloths about three hours. Boil the molasses 45 or 50 minutes, skimming thoroughly. Then add the glues drained of superfluous water. Boil the whole for 15 or 20 minutes, add the glycerine, boil and stir 3 to 5 minutes, then pour off. *No.* 3, *Strong Middle Weather Rollers. Temp.* 60° *to* 70° *Fahr.* Cooper's best glue, 8½ lbs.; extra syrup, 2 gals.; glycerine, 1 pt.; Venice turpentine, 2 ozs. Steep the glue in rain water until pliant, and drain it well. Then melt it over a moderate fire, but do not "cook it." This will take from 15 to 25 minutes. Next put in the syrup, and boil ⅔ of an hour, stirring it occasionally and skimming off impurities arising to the surface. Add the glycerine and turpentine a few minutes before removing from the fire, and pour slowly. Slightly reduce or increase the glue as the weather becomes colder or warmer.

Printing on Glass.—A Frenchman, named Wilbaux, has taken out a patent to use an elastic type for printing on glass with fluorspar rendered adhesive by some such material as mucilage or printers' ink; sulphuric acid of suitable temperature is then allowed to act on that portion of the glass.

* This article is taken from Theo. L. de Vinne's Price List, an excellent work (published by Francis Hart & Co., New York), that should be in the hands of every printer.

The hydrofluoric acid generated in this way would etch the glass on the places printed on. When completed, the whole is washed off with warm water and lye.

Liquid for Brightening Common Qualities of Black or Colored Inks.—Demar varnish, 1 oz.; balsam fir, ½ oz.; oil bergamot, 25 drops; balsam of copaiba, 35 drops; creosote, 10 drops; copal varnish, 50 drops. Use in small quantities. The whites of fresh eggs are also brighteners of colored inks, but they must be applied a little at a time, as they dry very hard, and are apt to take away the suction of rollers if used for any extended period.

Good Reducing Dryer.—Brown's (genuine) Japan. Use in small quantities. *Hardening Gloss for Inks.*—Gum arabic dissolved in alcohol or a weak dilution of oxalic acid. Use in small quantities, and mix with the ink as the latter is consumed.

To Give Dark Inks a Bronze or Changeable Hue.—Dissolve 1½ lbs. gum shellac in 1 gal. 65 per cent. alcohol or cologne spirits for 24 hours. Then add 14 oz. aniline red. Let it stand a few hours longer, when it will be ready for use. Add this to good blue, black, or other dark ink, as needed in quantities to suit, when if carefully done they will be found to have a rich bronze or changeable hue.

On Wood Cuts and New Wood Type.—Wood cuts should never be washed with lye or water, benzine or camphine only should be used. Large wood letters, when new, should be soaked in a mixture of turpentine and thin boiled linseed oil over night, and taken out of the bath in the morning, and then wiped clean. Let them stand a while to absorb what oil, etc., may not have been removed by wiping, then ink them well. After they stand a few hours wash them with benzine.

To Marble Books or Paper.—Provide a wooden trough 2 inches deep and the length and width of any desired sheet; boil in a brass or copper pan any quantity of linseed and water until a thick mucilage is formed; strain it into the trough, and let cool; then grind on a marble slab any of the following colors in small beer. For *Blue.*—Prussian blue or indigo. *Red.*—Rose-pink, vermilion, or drop lake. *Yellow.*—King's yellow, yellow ochre, &c. *White.*—Flake white. *Black.*—Burnt ivory or lamp black. *Brown.*—Umber, burnt do., terra di sienna, burnt do. *Black,* mixed with yellow or red, also makes brown. *Green.*—Blue and yellow mixed. *Orange.*—Red and yellow mixed. *Purple.*—Red and blue mixed. For each color you must have two cups, one for the color after grinding, the other to mix it with ox-gall, which must be used to thin the colors at discretion. If too much gall is used, the colors will spread; when they keep their place on the surface of the trough, when moved with a quill, they are fit for use. All things in readiness, the colors are successively sprinkled on the surface of the mucilage in the trough with a brush, and are waved or drawn about with a quill or a stick, according to taste. When the design is just formed, the book, tied tightly between cutting boards of the same size is lightly pressed with its edge on the surface of the liquid pattern, and then withdrawn and dried. The covers may be marbled in the same way only letting the liquid colors run over them. In marbling paper the side of the paper is gently applied to the colors in the trough. The film of color in the trough may be as thin as possible, and if any remains after the marbling it may be taken off by applying paper to it before you prepare for marbling again. To diversify the effects, colors are often mixed with a little sweet oil before sprinkling them on, by which means a light halo or circle appears around each spot.

Bookbinders' Varnish.—Shellac, 8 parts; gum benzoin, 3 parts; gum mastic, 2 parts; bruise, and digest in alcohol, 48 parts; oil of lavender, ½ part. Or, digest shellac, 4 parts; gum mastic, 2 parts; gum dammer and white turpentine, of each, 1 part; with alcohol (95 per cent.), 28 parts.

Red Sprinkle for Bookbinders' Use.—Brazilwood (ground), 4 parts; alum, 1 part; vinegar, 4 parts; water, 4 parts. Boil until reduced to 7

parts, then add a quantity of loaf sugar and gum; bottle for use. *Blue.*—Strong sulphuric acid, 8 oz.; Spanish indigo, powdered, 2 oz.; mix with a bottle that will hold a quart, and place it in a warm bath to promote solution. For use, dilute a little to the required color in a tea-cup. *Black.*—No better black can be procured than that made by the receipt for edge blacking, in this work, *which see*. *Orange color.*—Ground Brazilwood, 16 parts; annatto, 4 parts; alum, sugar, and gum arabic, each 1 part; water, 70 parts, boil, strain and bottle. *Purple.*—Logwood chips; 4 parts, powdered alum, 1 part; soft water, 24 parts; boil until reduced to 16 parts, and bottle for use. *Green.*—French berries, 1 part; soft water, 8 parts. Boil, and add a little powdered alum, then bring it to the required shade of green, by adding liquid blue. *Brown.*—Logwood chips, 1 part; annatto, 1 part, boil in water, 6 parts; if too light add a piece of copperas the size of a pea.

Tree-Marble.—A marble in the form of trees may be done by bending the boards a little on the centre, using the same method as the common marble, having the covers previously prepared. The end of a candle may be rubbed on different parts of the board to form knots. *Rice-Marble.*—Color the cover with spirits of wine and turmeric, then place on rice in a regular manner, throw on a very fine sprinkle of copperas water till the cover is nearly black, and let it remain till dry. The cover may be spotted with the red liquid or potash-water, very freely, before the rice is thrown off the boards. *Spotted Marble for Books, etc.*—After the fore-edge of the book is cut, let it remain in the press, and throw on linseeds in a regular manner, sprinkle the edge with any dark color till the paper is covered, then shake off the seeds. Various colors may be used; the edge may be colored with yellow or red before throwing on the seeds, and sprinkling with blue. The seeds will make a fine fancy edge when placed very thick on different parts, with a few slightly thrown on the spaces between. *Japan Coloring for Leather Book-covers, etc,*—After the book is covered and dry, color the cover with potash-water mixed with a little paste: give 2 good coats of Brazil wash, and glaze it; put the book between the hands, allowing the boards to slope a little; dash on copperas-water, then, with a sponge full of red liquid, press out, on the back and on different parts, large drops, which will run down each board and make a fine shaded red; when the cover is dry, wash it over 2 or 3 times with Brazil wash to give it a brighter color. (*See the various dyes for leather.*)

Gold Sprinkle for Books.—Put in a marble mortar ½ oz. pure honey and one book of gold leaf, rub them well together until they are very fine, add ½ pint clear water, and mix well together; when the water clears, pour it off, and put in more till the honey is all extracted, and nothing remains but the gold; mix one grain of corrosive sublimate in a teaspoonful of spirits of wine, and when dissolved, put the same, together with a little gum water, to the gold, and bottle for use. The edges of the book may be sprinkled or colored very dark, with green, blue, or purple, and lastly with the gold liquid in small or large spots, very regular, shaking the bottle before using. Burnish the edges when dry, and cover them with paper to prevent the dust falling thereon. This sprinkle will have a most beautiful appearance on extra work.

To Gild the Edges of Books.—Armenian bole, 4 parts; sugar candy, 1 part; white of egg to mix. Apply this composition to the edge of the leaves, previously firmly screwed in the cutting-press; when nearly dry, smooth the surface with the burnisher; then take a damp sponge and pass over it, and with a piece of cotton wool take the leaf from the cushion and apply it to the work; when quite dry, burnish, observing to place a piece of silver or India paper between the gold and the agate.

Chinese Edge for Books.—Color the edge with light liquid blue and dry; then take a sponge charged with vermilion and dab on spots according to fancy; next throw on rice, and finish the edge with dark liquid blue.

QUICK DRYER FOR INKS USED ON BOOKBINDERS' CASES.—Beeswax, 1 oz., gum arabic (dissolved in sufficient acetic acid to make a thin mucilage), ½ oz., Brown Japan, ½ oz. Incorporate with 1 lb. of good Cut ink. *To Renew a Hard Roller.*—Wash the roller carefully with lye, cover the surface with a thin layer of molasses and lay it aside till the next morning, then wash it with water, and let it hang till dry enough for using.

The terms *folio, quarto, octavo, duodecimo*, etc., indicate the number of leaves into which a sheet of paper is folded.

A sheet folded in	2 leaves	is called a folio.
A sheet folded in	4 leaves	" a quarto, or 4to.
A sheet folded in	8 leaves	" an octavo, or 8vo.
A sheet folded in	12 leaves	" a 12mo.
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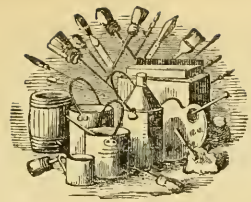

PAINTERS, PAPER HANGERS, &c.

Useful Hints to House, Sign, Carriage and Fresco-Painters, Mixing Colors, Filling Compositions, Graining, Staining, &c.

Paint.—A composition used for coating wood, stones, and metal with, for the purpose of protecting them against the effects of the atmosphere, and the ravages of time. The composition of paint is varied, according to the purpose to which it is put. *White house-paint* may be made as follows:—Two quarts of skim-milk, 8 ozs. of fresh slaked lime, 6 ozs. of linseed oil, 2 ozs. of white Burgundy pitch, 3 lbs. of Spanish white. The lime must be slaked in water, exposed to the air, mixed in about ¼ of the milk; the oil in which the pitch is previously dissolved must be added gradually, then the rest of the milk, and afterwards the Spanish white. This quantity is sufficient for 27 square yards, and the expense will not exceed a shilling. To make *a cheap paint impervious to the weather*:—Dissolve eight pounds of glue in boiling water, and with this slake a bushel of quicklime until it becomes of the usual consistence of paint. Lay on 3 coats of this mixture with a painter's brush, taking care that each coat is dry before it is succeeded by another; over the third dust sand or grey-stone dust from a dredger. By mixing ochre with the wash, any color desired may be obtained. It may be made green by mixing common blue and yellow ochre, and applying them hot. For a *green paint for garden stands, &c.*:—Mix a quantity of mineral green and white lead, ground in turpentine, with a small portion of turpentine varnish for the first coat; for the second, put as much varnish in the color as will produce a good gloss. To obtain a *substitute for oil-paint*:—Pour a gallon of boiling water upon a pound of quicklime and 2 ozs. of sugar of lead. When the lime has become completely slaked, the mixture is to be stirred, and it is then fit for use. If required thicker, less water must be used. Coloring ingredients may be added at will. This composition is about one-twelfth less in cost than that of oil-paint, and possesses almost equal efficacy and beauty. When exposed to the weather, it requires one coat or foil to protect it.

Painting Houses, Best Season for.—The outsides of houses should be painted during autumn or winter. Hot weather injures the paint by drying in the oil too quickly, and causing the paint to come off easily. But when the paint is laid on during cold weather, it hardens in drying, and is firmly set. The painting of the interior of houses should be regulated by the convenience of the occupants. If possible, they should endeavor to escape the annoyance by going out of town; but if that is not practicable, the painting should be done at such a season as will allow them to be a good deal out of doors, so as to escape the unpleasant consequences as much as possible. It is hardly necessary to say that while the painting is proceeding the furniture of the rooms should be carefully covered up. Birds, rabbits, and other domestic pets should also be removed from its influence, as, in many instances, the smell, to these animals, is sufficient to occasion disease and even death. If the interior of a house is properly painted in the

first instance, it will last for very many years, and obviate the necessity of repainting during a moderately long tenancy.

Window Painting.—The windows of a house may be very appropriately decorated, with the aid of a recent invention, termed *diaphanie*, which is a beautiful and inexpensive art, combining economy with perfect results. In carrying out this process, a peculiar kind of paper is rendered perfectly transparent, upon which designs are painted in glass colors, which will not change with the light. The paper is applied to the glass with clear white varnish, and when dry, a preparation is finally applied, which increases the transparency and adds tenfold brilliancy to the effect. There is another design, painted in imitation of half-light; this is used principally for a ground covering the whole surface with glass, within which (the neccessary spaces having been cut out before it is stuck on the glass) are placed medallion centres of Watteau figures, perfectly transparent, which derive increased brilliancy from the semi-transparency of the surrounding ground. This is by far the cheapest method, though involving extra trouble. To ascertain the number of designs required, measure the glass carefully, and then calculate how many sheets of the transparent designs it will take. The sheets are arrange so that they can be joined together continously, or cut to any size or shape. Choose a fine day for the operation, as the glass should be perfectly dry and unaffected by the humidity of the atmosphere. If possible, it is more convenient to work upon the glass before it is fixed in the frame. If you are operating on a piece of unattached glass, lay it on a flat table, or marble slab, over which must be previously laid a piece of baize, or cloth to keep the glass steady. The glass being thus fixed, clean and polish the surface on which you intend to operate (on windows this is the inner side), then with the brush lay on it a thick and even coat of the prepared varnish; let this dry for an hour, more or less, according to the state of the atmosphere and the thickness of the coat of varnish. Meantime, cut out and trim the designs carefully to fit the glass; then lay on a piece of paper, face downwards, and damp the back of it with a sponge, applied several times, to equalize the moisture. In this operation, arrange the time, so that the designs may be left finally to dry for a quarter of an hour before application to the glass, the varnish on which will have become sticky, and in a proper state to receive the designs. Apply the painted side next to the glass without pressure; endeavor to let the sheet fall perfectly level and smooth on the glass, so that you may avoid leaving creases, which would spoil the whole. Take now your palette, lay it flat on the design, and press out all the air bubbles, commencing in the centre, and working them out from the sides. An ivory stick will be found useful in removing the creases. The work is now to be left to dry, and after 24 hours, apply a slight coat of *liqueur diaphane*, leaving it for another day, when, if dry, apply a second coat of the same kind as the first, which must be left undisturbed for several days; finally apply a coat of varnish over all. If these directions are carefully followed, the glass will not be affected, either by time or the variations of weather; and it can be washed in the same manner as ordinary stained glass, to which in some respects it is superior. The materials used in the practice of this art may be obtained of any artists' colorman.

Painted Glass, to Preserve.—As painted glass is generally protected by grating, it cannot be cleaned on the outside; in consequence of which, long continued damp produces a diminutive moss or lichen, which absolutely decomposes the substance of the glass. This evil would be in a great measure prevented by removing the grating annually, and carefully wiping away the mouldy moss when it begins to appear. It is remarkable that this disease prevails in some situations more than others. Painted glass has been known to remain in a dry situation for centuries uninjured, but on being removed into a moist and foggy atmosphere has lost almost all its beauty in 20 or 30 years.

Paint, to Remove the Smell of.—The smell of paint, besides being very disagreeable, is liable to produce headache, sickness, &c., and sometimes

occasion even more serious maladies. To remove the smell of paint from rooms, &c., both of the following methods will be found efficacious:—Place a vessel filled with lighted charcoal in the middle of the room, and throw on it 2 or 3 handfuls of juniper-berries, close the windows, chimney, and the door; 24 hours afterwards the room may be opened, when it will be found that the sickly unpleasant smell is entirely gone. The smoke of the juniper-berry possesses the advantage of leaving uninjured the tapestry, curtains, and other furniture of the room. Or fill 3 or 4 new tubs with about 8 gallons of water, and an ounce of vitriolic acid, and place them in the newly painted room, near the wainscot; the water will absorb and retain the effluvia from the paint in three days, but the water should be renewed each day during that time.—

USEFUL HINTS TO PAINTERS.—*Painters' Colic.* To 2½ gals. spruce or table beer add 1 drachm of sulphuric acid, mix well and let it stand 3 hours. A tumbler full 2 or 3 times per day is said to be very beneficial in cases of lead colic. Sweet oil and milk are also good, but acid, fruits, spirituous liquors, and vinegar should be avoided in every illness caused by paint. Avoid inhaling the dust when handling dry colors, or drinking water which has stood long in a painted room or paint shop. Never eat or sleep without washing the hands and face, and rinsing the mouth, cleaning well out under the nails. Bathe the whole body every few days, avoid spattering your clothes, and either wear overalls or change your garments every week, well airing those you put off. Keep your paint shop clean, well ventilated, and avoid sleeping in it at any time. *To Remove Paint from Clothing.* Saturate the spots with equal parts turpentine and spirits of ammonia until they become soft, then wash out with soapsuds. *To dissolve Paint Skins, Cleanings of Pots, Brushes, &c.* Save them carefully, and dissolve them by boiling them in oil. *To Clean Brushes.* Use turpentine first, then wash in warm soapsuds. *To Clean Paint Pails, &c.* Use strong lye, hot. *Sanding.* The perforated sprinkler of a watering pot attached to the nozzle of a pair of bellows, is a first-rate contrivance for applying sand to painted work. Apply on the fourth or fifth coat, with another coat on the sand. To remove old putty, apply nitric or muriatic acid.

HOUSE PAINTING.—*Priming*, apply as thick as the paint will spread easily, rubbing out well with the brush. Use litharge as a dryer. After sandpapering and dusting, putty up all the nail heads and cracks with a putty-knife. *Outside second Coat.* Mix your paint with raw oil, using it as thick as possible, consistent with easy spreading. After it is applied, cross-smooth the work until it is level and even, then finish lengthwise with long light sweeps of the brush. *Outside third Coat.* Make a little thinner than the last, rub out well, cross-smooth and finish very lightly with the tip of the brush. *Inside second Coat.* Mix your paint as thick as you can work it, using equal parts of raw oil and turpentine, rub this out well and carefully with the brush, cross-smooth and finish even and nice. *Inside third Coat.* Mix with 3 parts turpentine and 1 part of raw oil, rub out well and smooth off with great care. *Fourth Coat Flatting.* Mix with turpentine alone thin enough to admit of spreading before it sets. Apply quickly without cross-smoothing, and finish lengthwise with light touches of the tip of the brush, losing no time, as it sets rapidly. *Drawn Flatting.* Ground white lead is mixed with turpentine almost as thin as the last-named mixture. The lead will soon settle and the oil and turpentine rise to the top, pour it off, and repeat the mixture until what rises to the top is clear turpentine. The oil being all withdrawn by this process, the lead is mixed with turpentine, and applied thickly and evenly with great care. This is used as a fourth coat, and the room must be kept shut and free from draught, as the color sets as fast as it is put on. See PORCELAIN FINISH FOR PARLORS. *Plastered Walls.* Give them a coat of glue size before painting in oil. *Killing Smoky Walls or Ceilings.* Wash over the smoky or greasy walls with nitre, soda, or thin lime whitewash, the last is the best.

HARD DRYING PAINT.—Grind Venetian red or any other color you

wish, in boiled oil; then thin it with black japan. It will dry very hard for counter tops, &c.

Paste for Paper Hangings, Books, Paper Boxes, &c.—Good wheat flour, sifted, 4 lbs., make it into a stiff batter with cold water in a pail, beat it well to break the lumps, then add pulverized alum, 2 ozs. Into this pour boiling water, hissing hot from the fire, stirring the batter thoroughly all the time. As it cooks it swells and loses its white color, and when cold, will make about ¾ of a pail of thick paste. Thin with cold water to adapt it for easy use with the brush. For painted or varnished walls, add ½ oz., pulverized resin to each 2 qts. paste, and reduce the mass with thin gum arabic or glue water. A little pulverized corrosive sublimate will enhance the keeping qualities of paste, but alum used as above will do very well.

To Remove Old Paint.—Sal soda, 2 lbs.; lime, ¼ lb.; *hot* water, 1 gal.; rummage all together and apply to the old paint while warm. It will soon loosen the paint so that you can easily remove it. Another simple method is to sponge over your old paint with benzine, set it on fire, and you can then flake off the paint as quick as you like. Do not attempt to go over too much surface at a time otherwise you might get more to do than you can attend to.

Refuse Paint and Paint Skins.—Dissolve sal soda, ½ lb., in rain water, 1 gal.; cover the refuse paint for 2 days, then heat it, adding oil to reduce it to a proper consistence for painting and straining.

To Use Smalts.—For a gold lettered sign, lay out on a lead color or white surface the line of letters, and roughly size the shape of each letter with *fat oil size*. This must be allowed at least 12 hours to get tacky and ready for gilding. After the gold leaf is laid and perfectly dry, mix up (for blue smalts) Prussian blue and keg lead with oil, adding a little dryer. Outline carefully around the letters, and fill up all the outside with blue paint; then with a small sieve sift on the smalts, allowing the sign to lay horizontally. Cover every part with plenty of smalts, and allow it to remain unmolested until the paint is dry. Then carefully shake off the surplus smalts, and the work is done.

To Harden Whitewash.—To ½ pail common whitewash add ½ pint of flour. Pour on boiling water in quantity to thicken it. Then add 6 gals. of the lime water, and stir well.

Whitewash that will not Rub Off.—Mix up half a pailful of lime and water, ready to put on the wall; then take ¼ pt. flour, mix it up with water; then pour on it boiling water, a sufficient quantity to thicken it; then pour it while hot into the whitewash, stir all well together, and it is ready for use.

Whitewash.—The best method of making a whitewash for outside exposure is to slake ½ bushel of lime in a barrel, add 1 lb. of common salt, ½ lb. of the sulphate of zinc, and a gallon of sweet milk. Any desired color may be imparted to whitewash by adding coloring matter to suit. See *Compound Colors*.

For Knotting.—One pint of vegetable naphtha, 1 tablespoonful of red lead, ¼ pint of japanners' gold size, 7 ozs. of orange shellac, mix all together set in a warm place to dissolve, and frequently shake. *Another.*—Mix white lead, or red lead powder, in strong glue size, and apply it warm.

White Lead.—The most usual method of manufacturing white lead is that known as the Dutch method. It consists in exposing lead, cast in thin gratings, to the combined action of acetic acid, moist air and carbonic acid gas. The gratings are supported a little above the bottom of earthen pots, similar to flower pots, in each of which a small quantity of weak acetic acid is placed. The pots are built up in alternate layers with spent tanners' bark, until a stack is formed, each layer of pots being covered with a board. Fermentation soon takes place in the tan, and serves the double place of generating heat and supplying carbonic acid. After the lapse of six or eight weeks, the metallic lead is found converted into white masses

of carbonic mixed with hydrated oxide. It is then levigated, washed, dried, and ground with oil.

To Cure Damp Walls.—Boil 2 ozs. of grease with 2 quarts of tar, for nearly twenty minutes, in an iron vessel, and have ready pounded glass, 1 lb., slaked lime, 2 lbs., well dried in an iron pot and sifted through a flour sieve; add some of the lime to the tar and glass, to make it the thickness of thin paste, sufficient to cover a square foot at a time, as it hardens so quick. Apply it about an eighth of an inch thick.

To Protect Wood and Brick work from Damp Weather.—Take 3 pecks of lime, slaked in the air, 2 pecks of wood-ashes, and 1 peck of white sand. Sift them fine, and add linseed oil sufficient to use with a paint brush: thin the first coat; use it as thick as it will work for the second coat, grind it fine, or beat it in a trough, and it is a good composition.

Putty for Repairing Broken Walls.—The best putty for walls is composed of equal parts of whiting and plaster of paris, as it quickly hardens. The walls may be immediately colored upon it. Some painters use whiting with size; but this is not good, as it rises above the surface of the walls, and shows the patches when the work is finished. Lime must not be used as putty to repair walls, as it will destroy almost every color it comes in contact with.

Transparent Painting on Window Shades.—The muslin is spread on a frame and secured tightly with tacks, then sized with a mixture of fine flour paste, white glue, and and white bar soap; the soap renders the muslin pliable and soft. A thin coat is applied, which is nearly invisible when dry. A coat of pure linseed oil, diluted with spirits of turpentine, is then applied, to the whole, or part, as desired, lay it on quickly and smoothly, to insure an even transparent surface. The colors used are, ivory black, ultramarine, Paris green, sienna umber, verdigris, asphaltum, or other suitable colors. An outline of the design is drawn with a small pencil with black or umber, after which the colors may be applied, more or less diluted, as more or less transparency is desired. In general, the brightest colors should be applied first, and the darker shades over them. These colors must be laid evenly and smoothly with soft brushes, and should any part be made too dark, the best way is to scrape off with a stick before the color gets too dry. The best designs for shades consists of landscape views, and should always be designed to accommodate the form and position of the ground on which they are drawn. Stencils will be found useful on this work, in making corners of stripes for borders.

To Paint Magic Lantern Slides.—Transparent colors only are used for this work, such as lakes, sap-green, ultramarine, verdigris, gamboge, asphaltum, &c., mixed in oil, and tempered with light colored varnish (white Demar). Draw on the paper the design desired, and stick it to the glass with water or gum; then with a fine pencil put the outlines on the opposite side of the glass with the proper colors; then shade or fill up with black or Vandyke brown, as you find best.

Marine Paint for Metals in Salt Water.—Red lead, 55 parts; quicksilver, 30 parts; thick turpentine, 7 parts. Mix with boiled linseed oil to the proper consistency. The quicksilver must be thoroughly amalgamated with the thick turpentine by grinding or rubbing, and this mixture must be ground with red lead and more boiled oil. As little oil as is necessary to make the paint lay well must be used. To make the paint adhere more firmly, a previous coat of oxide of iron paint may be used.

Crystal Varnish, for Maps, &c.—Canada balsam, 1 oz.; spirits of turpentine, 2 oz.; mix together. Before applying this varnish to a drawing or colored print, the paper should be placed on a stretcher, and sized with a thin solution of isinglass in water, and dried. Apply with a soft camel's hair brush.

Best Wash for Barns and Houses.—Water lime, 1 peck; freshly slacked lime, 1 peck; yellow ochre in powder, 4 lbs.; burnt umber, 4 lbs. To be dissolved in hot water, and applied with a brush.

Durable Outside Paint.—Take 2 parts (in bulk) of water lime,

ground fine; 1 part (in bulk) of white lead, in oil. Mix them thoroughly, by adding *best* boiled linseed oil, enough to prepare it to pass through a paint-mill; after which, temper with oil till it can be applied with a common paint brush. Make any color to suit. It will last 3 times as long as lead paint. It is Superior.

Farmers' Paint.—Farmers will find the following profitable for house or fence paint: skim milk, two quarts, fresh slaked lime, 8 oz.; linseed oil, 6 oz.; white Burgundy pitch, 2 oz.; Spanish white, 3 lbs. The lime is to be slaked in water, exposed to the air, and then mixed with about one-fourth of milk; the oil in which the pitch is dissolved to be added a little at a time, then the rest of the milk, and afterwards the Spanish white. This is sufficient for twenty-seven yards, 2 coats. This is for white paint. If desirable, any other color may be produced; thus, if a cream color is desired, in place of part of the Spanish white use the other alone.

To Paint Banners, etc., on Cloth or Silk.—Stretch the fabric upon a frame, and finish your design and lettering. Use a size made of bleached shellac dissolved in alcohol, thinned to the proper consistence, go over such parts as are to be gilded or painted, overrunning the outlines slightly, to prevent the color from spreading. For inside work the white of an egg makes a good size; lay the gold while the size is still wet, when dry dust off the surplus gold, and proceed with the shading, painting, &c. A little honey, combined with thick glue, is another good size.

Japanned Tin Signs.—Draw your letters on paper to suit your piece of tin, having first cleaned it with diluted alcohol and a piece of cotton. This will remove any grease or other matter that might hold the gold. Then take some whiting and rub it over the back of the paper upon which your design is made and lay it upon the japanned tin. Next place a weight upon the four corners of the paper, or otherwise fix it securely to the tin; then, with a fine pointed piece of wood, trace the design carefully, bearing upon the paper with the point just hard enough to cause the whiting on the under side of the paper to adhere to the tin, and after going carefully over the whole, you will have transferred the entire design in fine white outline to the tin you are to finish it upon. Now size with oil size, and, and when dry enough for gilding lay on the gold leaf and dab it down thoroughly, afterwards brushing off the loose gold with your flat camel-hair brush or cotton.

Changeable Signs.—Make a wooden sign in the usual manner, and have a projecting moulding around it. Now cut thin grooves into the moulding, an inch apart, allowing each cut to reach to the surface of the sign. In each of these grooves insert strips of tin one inch wide; and long enough to reach quite across the sign board. When all are fitted, take out the tin strips, and placing them edge to edge on a level table, paint any desired words on their united surface; when dry reverse them and paint other words on the opposite side. Now finish your lettering as usual on the wooden sign board, and when dry, insert the painted tin strips in correct order in the grooves. This will present the curious novelty of three signs in one, as viewed from different positions.

Transparent Cloth.—Dissolve together white resin, pulverized, 8 oz.; bleached linseed, 6 oz; white beeswax, 1½ ozs.; add the turpentine while hot. Apply to both sides of the cloth while it is stretched tight. A good vehicle for mixing colors for painting on cloth or paper is gum shellac dissolved in alcohol.

Tinselled Letter Glass Signs.—Paint the ground-work of your sign on glass, any desired color, but be careful to leave the lettering or design naked, after it is dry, take any of the fancy colored copper or tin foils, crumple them in your hand and apply them over the black lettering, &c., after partially straightening them out.

To Incrust Window Glass with Jewels.—Dissolve dextrine in a concentrated solution of sulphate of magnesia, sulphate of zinc, sulphate of copper or other metallic salts, strain the liquid and brush a thin coat of it over the

glass and dry slowly at the ordinary temperature, keeping the glass level. For protection it may be varnished. The effect produced is that of an incrustation of diamonds, sapphires, &c., according to the color of the salt used.

To Paint in Imitation of Ground Glass.—Grind and mix white lead in three-fourths of boiled oil and one-fourth spirits of turpentine, and to give the mixture a very drying quality, add sufficient quantities of burnt white vitriol and sugar of lead. The color must be exceedingly thin, and put on the panes of glass with a large sized paint brush in as even a manner as possible. When a number of the panes are thus painted, take a dry duster, quite new, dab the ends of the bristles on the glass in quick succession, till you give it a uniform appearance. Repeat this operation till the work appears very soft, and it will then appear like ground glass. When glass requires fresh painting, get the old coat off, first by using strong pearl-ash water. *Another Method.*—Spirits of salts, 2 oz.; oil of vitriol, 2 oz.; sulphate of copper, 1 oz.; gum arabic, 1 oz.; mix well together and dab on the glass with a brush. *Another.*—Dab your squares regularly over with putty; when dry go over them again. The imitation will be complete.

Pencils for Writing on Glass.—Stearic acid, 4 pts.; mutton-suet, 3 pts.; wax, 2 pts.; melt together and add 6 parts of red lead, and 1 pt. purified carbonate of potassa, previously triturated together; set aside for an hour in a warm situation, stirring frequently; then pour into glass tubes or hollow reeds.

French Putty.—Seven lbs. linseed oil, and 4 lbs. brown umber are boiled for two hours, and 62 grammes wax stirred in. After removal from the fire 5½ lbs. fine chalk and 11 lbs. white lead are added and thoroughly incorporated; said to be very hard and permanent.

Japan Drier, Best Quality.—Take linseed oil, 1 gal.; put into it gum shellac, ¾ lb.; litharge and burned Turkey umber, each ½ lb.; red lead, ½ lb.; sugar of lead, 9 oz. Boil in the oil till all are dissolved, which will require about 4 hours; remove from the fire, and stir in spirits of turpentine, 1 gal., and it is done. 2. Linseed oil, 5 gals.; add red lead and litharge, each 3½ lbs.; raw umber, 1¼ lbs,; sugar of lead and sulphate of zinc, each, ½ lb.; pulverize all the articles together, and boil in the oil till dissolved; when a little cool, thin with turpentine, 6 gals. 3. Linseed oil, 4 gals, red lead and umber, of each 8 oz.; sulphate of zinc, 4 ozs.; sugar of lead, 4 ozs. Boil until it will scorch a feather, when it is ready for use. 4. Nut or linseed oil, 1 gal.; litharge, 12 ozs.; sugar of lead and white vitriol, of each, 1 oz.; simmer and skim until a pellicle forms; cool, and, when settled, decant the clear. 5. Oil, 1 gal.; litharge, 12 to 16 oz.; as last. 6. Old nut or linseed oil, 1 pint; litharge, 3 oz. Mix; agitate occasionally for 10 days; then decant the clear. 7. Nut oil and water, of each, 2 lbs.; white vitriol, 2 ozs.; boil to dryness. 8. Mix oil with powdered snow or ice, and keep it for 2 months without thawing.

To Reduce Oil Paint with Water.—Take 8 lbs. of pure unslaked lime. add 12 qts. water, stir it and let it settle, turn it off gently and bottle it; keep it corked till used. This will mix with oil, and in proportion of half will render paint more durable.

Oil Paint.—To Reduce with Water.—Gum shellac, 1 lb.; sal-soda, ½ lb.; water, 3 parts; boil all together in a kettle, stirring till dissolved. If it does not all dissolve, add a little more sal-soda; when cool, bottle for use; mix up 2 quarts of oil paint as usual, any color desired, using no turpentine; put 1 pint of the gum shellac mixture with the oil paint when it becomes thick; it can then be reduced with water to a proper thickness to lay on with a brush.

Another Method.—Soft water, 1 gal.; dissolve it in pearl-ash, 3 ozs.; bring to a boil, and slowly add shellac, 1 lb.; when cool it is ready to be added to oil paint in equal proportions.

Flexible Paint for Canvas.—Yellow soap, 2½ lbs.; boiling water, 1½ gals.; dissolve; grind the solution while hot with *good oil pain*' 1¼ cwt.

PAINTERS' CREAM.—Pale nut oil, 6 ozs.; mastic, 1 oz.; dissolve; add of sugar of lead, ½ oz., previously ground in the least possible quantity of oil; then add of water *q. s.* gradually, until it acquires the consistency of cream, working it well all the time. Used to cover the unfinished work of painters. It will wash off with water.

SMALT.—Roast cobalt ore to drive off the arsenic; make the residuum into a paste with oil of vitriol, and heat it to redness for an hour; powder, dissolve in water, and precipitate the oxide of iron by carbonate of potash, gradually added until a rose-colored powder begins to fall; then decant the clear, and precipitate by a solution of silicate of potash, prepared by fusing together for 5 hours a mixture of 10 parts of potash, 15 parts of finely-ground flints, and 1 part charcoal. The precipitate, when dry, may be fused and powdered very fine. It is much the cheapest way to buy smalts ready made.

FACTITIOUS LINSEED OIL.—Fish or vegetable oil, 100 gallons; acetate of lead, 7 lbs.; litharge, 7 lbs.; dissolve in vinegar, 2 gallons. Well mixed with heat, then add boiled oil, 7 gallons; turpentine, 1 gallon. Again well mix.

SUBSTITUTE FOR WHITE LEAD.—Sulphate of barytes ground in oil and applied like paint. It can also be used to reduce white lead to any desired extent.

PAINT FOR BLACK BOARDS IN SCHOOLS.—Common glue, 4 ozs.; flour of emery, 3 ozs.; and just lampblack enough to give an inky color to the preparation Dissolve the glue in ¾ qt. of warm water, put in the lamp black and emery, stir till there are no lumps, then apply to the board with a woollen rag smoothly rolled. Three coats are amply sufficient.

COMPOUND IRON PAINT.—Finely pulverized iron filings, 1 part; brick dust, 1 part; and ashes, 1 part. Pour over them glue-water or size, set the whole near the fire, and, when warm, stir them well together. With this paint cover all the wood work which may be in danger; when dry, give a second coat, and the wood will be rendered incombustible.

FILLING COMPOSITIONS—12 KINDS.—1. Work finished in oil should receive a substantial filling consisting of equal parts by weight of whiting, plaster of Paris, pumice-stone, and litharge, to which may be added a little French yellow, asphaltum, Vandyke brown, and *terra di sienna*. Mix with 1 part japan, 2 of boiled oil, and 4 of turpentine. Grind fine in a mill. Lay the filling on with a brush, rub it in well, let it set 20 minutes, then rub off clean. Let it harden for some time, rub smooth, and if required, repeat the process. When the filling is all right, finish with linseed oil, applying with a brush, wipe off, and rub to a polish with fine cotton, and finish with any fine fabric. Some fill with rye flour, wheat flour, corn starch, Paris white, &c., ground fine in oil and turpentine, but when work is to be varnished, such filling should previously receive one or two good coats of shellac. 2. Boiled linseed oil, 1 qt.; turpentine, 3 qts.; corn starch, 5 lbs.; japan, 1 qt.; calcined magnesia, 2 ozs. Mix thoroughly. 3. Whiting, 6 ozs.; japan, ½ pt.; boiled linseed oil, ¾ pt.; turpentine, ½ pt.; corn starch, 1 oz.; mix well together and apply to the wood. On walnut wood add a little burnt umber; on cherry a little Venetian red, to the above mixture. 4. On furniture apply a coat of boiled linseed oil, then immediately sprinkle dry whiting upon it, and rub it in well with your hand or a stiff brush, all over the surface; the whiting absorbs the oil, and fills the pores of the wood completely. For black walnut, add a little burnt umber to the whiting; for cherry, a little Venetian red, &c., according to the color of the wood. Turned work can have it applied while in motion in the lathe. Furniture can afterwards be finished with only one coat of varnish. 5. Terra alba is a very good and very cheap filling. Many painters have been most shamefully imposed on by parties selling the stuff at a high price. 6. *Furniture Pastes.*—Beeswax, spts. turpentine and linseed oil, equal parts; melt and cool. 7. Beeswax, 4 ozs.; turpentine, 10 ozs.; alkanet root to color; melt and strain. 8. Beeswax, 1 lb.; linseed oil, 5 ozs.; alkanet root, ½ oz.; melt

and add 5 ozs. turpentine, strain and cool. 9. Beeswax, 4 ozs.; resin, 1 oz.; oil of turpentine, 2 ozs.; digest until sufficiently colored, then add resin till dissolved, then add beeswax scraped small, 4 ozs.; put the vessel into hot water, and stir till dissolved. If wanted *pale* the alkanet root should be omitted. 10. (White.) White wax, 1 lb.; liquor of potassa, ½ gal.; boil to a proper consistency. 11. Beeswax, 1 lb.; soap, ¼ lb.; pearl-ash, 3 ozs., dissolved in water, ½ gal.; strain and boil as the last. 12. Yellow wax, 18 parts; resin, 1 part; alkanet root, 1 part; turpentine, 6 parts; linseed oil, 6 parts. First steep the alkanet in oil with heat, and, when well colored, pour off the clear on the other ingredients, and again heat till all are dissolved. 13. *Furniture Cream.*—Beeswax, 1 lb.; soap, 4 ozs.; pearl-ash, 2 ozs.; soft water, 1 gal.: boil together until mixed.

POLISHES—15 KINDS.—1. *Carvers' Polish.*—White resin, 2 ozs.; seedlac, 2 ozs.; spirits of wine, 1 pt. Dissolve. It should be laid on warm. Avoid moisture and dampness when used. 2. *French Polish.*—Gum shellac, 1 oz.; gum arabic, ¼ oz.; gum copal, ¼ oz. Powder, and sift through a piece of muslin; put them in a closely corked bottle with 1 pt. spirits of wine, in a very warm situation, shaking every *day* till the gums are dissolved; then strain through muslin, and cork for use. 3. *Polish for Dark-colored Woods.*—Seedlac, 1 oz.; gum guaiacum, 2 drs.; dragon's blood, 2 drs.; gum mastic, 2 drs.; put in a bottle with 1 pt. spirits of wine, cork close, expose to a moderate heat till the gums are dissolved; strain into a bottle for use, with ¼ gill of linseed oil; shake together. 4. *Waterproof Polish.*—Gum benjamin, 2 ozs.; gum sandarac, ¾ oz.; gum anima, ¼ oz.; spirits of wine, 1 pt.; mix in a closely stopped bottle, and place either in a sand bath or in hot water till the gums are dissolved, then strain off the mixture, shake it up with ¼ gill of the best clear poppy oil, and put it by for use. 5. *Finishing Polish.*—Gum shellac, 2 drs.; gum benjamin, 2 drs.; put into ½ pt. best rectified spirits of wine in a bottle closely corked; keep in warm place, shaking frequently till the gums are dissolved. When cold, shake up with it two teaspoonfuls of the best clear poppy oil. 6. *Polish for Removing Stains, Spots, and Mildew from Furniture.*—Take of 98 per cent. alcohol, ½ pint; pulverized resin and gum shellac, of each ¼ oz. Let these cut in the alcohol; then add linseed oil, ½ pt.; shake well, and apply with a sponge, brush, or cotton flannel, or an old newspaper, rubbing it well after the application, which gives a nice polish. 7. *Polish for Reviving Old Furniture.*—Take alcohol, 1½ oz.; spirits of salts (muriatic acid), ½ oz.; linseed oil, 8 ozs.; best vinegar, ½ pt.; and butter of antimony, 1½ oz.; mix, putting in the vinegar last. 8. *Jet or Polish for Wood or Leather, Black, Red or Blue.*—Alcohol (98 per cent.), 1 pt.; sealing wax, the color desired, 3 sticks; dissolve by heat and have it warm when applied. A sponge is the best to apply it with. 9. *Polish for Turners'-Work.* Dissolve sandarac, 1 oz., in spirit of wine, ½ pt.; next shave beeswax, 1 oz.; and dissolve it in a sufficient quantity of spirits of turpentine to make it into a paste, add the former mixture by degrees to it, then with a woollen cloth apply it to the work while it is in motion in the lathe, and with a soft linen rag polish it. It will appear as if highly varnished. 20. *Furniture Polish.*—Beeswax, ½ lb., and ¼ of an oz. of alkanet root; melt together in a pipkin until the former is well colored. Then add linseed oil and spirits of turpentine, of each half a gill; strain through a piece of coarse muslin. 11. *French Polishes.*—1. Shellac, 3 lbs.; wood naphtha, 3 pts.; dissolve. 2. Shellac, 2 lbs.; powdered mastic and sandarac, of each 1 oz.; copal varnish, ½ pint; spirits of wine, 1 gal. Digest in the cold till dissolved. 12. *Black Walnut Polish.*—Take pulverized asphaltum; put it in a jar or bottle, pour over it about twice its bulk of turpentine or benzole, put in a warm place, and shake occasionally; when dissolved, strain, and apply it to the wood with a cloth or stiff brush; should it prove too dark, dilute with turpentine or benzole. If desired to bring out the grain still more, apply a mixture of boiled oil and turpentine; this is better than oil alone. When the oil is dry, the wood can be polished with the following: shellac varnish, 2 parts, boiled oil, 1 part; shake it well before using. Apply with a cloth, rubbing

briskly. 13. *To Polish Wood.*—Take a piece of pumice-stone and water, and pass repeatedly over the work until the rising of the grain is cut down. Then take powdered tripoli and boiled linseed oil, and polish the work to a bright surface. 14. *Clock Case and Picture Frame Finish.*—Copal varnish 2 lbs.; linseed oil varnish, ½ oz.: mix well, shake often, and place in a warm spot. The wood to be varnished is prepared with a thin coat of glue-water, and rubbed down with fine pumice-stone or something equivalent. In light-colored wood, a light pigment, such as chalk, is added to the glue-water; in dark wood, a dark pigment is added. When ready, the articles are varnished with the mixture, and, after drying, rubbed with a solution of wax in ether, thereby receiving a high polish. 15. *White Polish for White Woods.* White bleached shellac, 3 ozs.; white gum benzoin, 1 oz.; gum sandarac, ½ oz.; spirits of wine or naphtha, 1 pt. Dissolve.

Oil Finishes.—1. Linseed oil, 16 ozs.; black resin, 4 ozs.; vinegar, 4 ozs.; rectified spirits, 3 ozs.; butter of antimony, 10 ozs.; spirit of salts, 2 ozs.; melt the rosin, add the oil, take it off the fire, and stir in the vinegar; let it boil for a few minutes, stirring it; when cool, put it into a bottle, add the other ingredients, shaking all together. 2. Linseed oil, 1 pt.; oil of turpentine, ½ pt.; rectified spirits, 4 ozs.; powdered resin, 1½ oz.; rose pink, ½ oz.; mix. 3. Acetic acid, 2 drs.; oil of lavender, ½ dr.; rectified spirits, 1 dr.; linseed oil, 4 ozs. 4. Linseed oil, 1 pt.; alkanet root, 2 ozs.; heat, strain, and add lac varnish, 1 oz. 5. Linseed oil, 1 pt.; rectified spirits, 2 ozs.; butter of antimony, 4 ozs. 6. Linseed oil, 1 gal.; alkanet root, 3 ozs.; rose pink, 1 oz. Boil them together ten minutes, and strain so that the oil be quite clear.

Porcelain Finish, Very Fine for Parlors.—To prepare the wood for the finish, if it be pine, give one or two coats of transparent varnish, which prevents the pitch from oozing out, causing the finish to turn yellow; next, give the room at least four coats of pure zinc, which may be ground in only sufficient oil to enable it to grind properly; then mix to a proper consistence with turpentine or naphtha. Give each time to dry. When it is dry and hard, sandpaper it to a perfectly smooth surface, when it is ready to receive the finish, which consists of two coats of French zinc ground in, and thinned with Demar varnish, until it works properly under the brush.

Silver Polish Kalsomine.—Take 7 lbs. of Paris white and ¼ lb. of light-colored glue. Set the glue in a tin vessel containing 3 pts. of water, let it stand over night to soak, then put it in a kettle of boiling water over the fire, stirring till it is well dissolved and quite thin. Then, after putting the Paris white into a large water pail, pour on hot water and stir it till it appears like thick milk. Now mingle the glue liquid with the whiting, stir it thoroughly and apply with a whitewash brush, or a large paint brush.

Prussian Blue.—Take nitric acid, any quantity, and as much iron shavings from the lathe as the acid will dissolve; heat the iron as hot as can be handled with the hand; then add it to the acid in small quantities as long as the acid will dissolve it; then slowly add double the quantity of soft water that there was of acid, and put in iron again as long as the acid will dissolve it. 2d. Take prussiate of potash, dissolve it in the hot water to make a strong solution, and make sufficient of it with the first to give the depth of tint desired, and the blue is made. *Another method.*—A very passable Prussian blue is made by taking sulphate of iron (copperas) and prussiate of potash, equal parts of each; and dissolving each separately in water, then mixing the two waters.

Chrome Yellow.—1st. Take sugar of lead and Paris white, of each 5 lbs.; dissolve them in hot water. 2d. Take bichromate of potash, 6½ oz.; and dissolve it in hot water also; each article to be dissolved separately; then mix all together, putting in the bichromate last. Let stand 24 hours.

Chrome Green.—Take Paris white, 6¼ lbs.; sugar of lead and blue vitriol, of each 3½ lbs.; alum, 10½ oz.; best soft Prussian blue, and chrome yellow, of each 3¼ lbs. Mix thoroughly while in fine powder, and add water

1 gal., stirring well, and let stand 3 or 4 hours. *Another Green, durable and cheap.*—Take spruce yellow, and color it with a solution of chrome yellow and Prussian blue, until you give it the shade you wish. *Another Method.*—Blue vitriol, 5 lbs.; sugar of lead, 6½ lbs.; arsenic, 2½ lbs.; bichromate of potash, 1½ oz.; mix them thoroughly in fine powder, and add water 3 parts, mixing well again and let stand 3 or 4 hours

Pea Brown.—1st. Take sulphate of copper any quantity and dissolve it in hot water. 2d. Take prussiate of potash, dissolve it in hot water to make a strong solution; mix the two solutions, as in the blue, and the color is made.

Rose Pink.—Take Brazil wood 1 lb., and boil it for 2 hours, having 1 gal. of water at the end; then strain it, and boil alum, 1 lb., in the water until dissolved; when sufficiently cool to admit the hand, add muriate of tin, ¾ oz. Now have Paris white, 12½ lbs.; moisten up to a salvy consistence, and when the first is cool, stir them thoroughly together. Let stand 24 hours.

Patent Yellow.—Common salt, 100 lbs., and litharge, 400 lbs., are ground together with water, and for some time in a gentle heat, water being added to supply the loss by evaporation; the carbonate of soda is then washed out with more water, and the white residuum heated till it acquires a fine yellow color.

Naples Yellow.—No. 1. Metallic antimony, 12 lbs.; red lead, 8 lbs.; oxide of zinc, 4 lbs. Mix, calcine, triturate well together, and fuse in a crucible; the fused mass must be ground and elutriated to a fine powder.

Cheap Yellow Paint.—Whiting, 3 cwt.; ochre, 2 cwt.; ground white lead, 25 lbs. Factitious linseed oil to grind.

Stone Color Paint.—Road-dust sifted, 2 cwt.; ground white lead, ½ cwt.; whiting, 1 cwt.; ground umber, 14 lbs.; lime water, 6 gals. Factitious linseed oil to grind.

Glazier's Putty.—Whiting, 70 lbs.; boiled oil, 20 lbs. Mix; if too thin, add more whiting; if too thick, add more oil.

To Imitate Brown Freestone.—First make a pretty thick oil paint of the same color as the stone to be imitated, which may be done in different ways; the basis is white lead or zinc white, colored with umber and mars red, or any other pigments which suit you; put it on as usual, and while yet sticky throw common white sand against it; this will not affect the color, and will make a rough, sandy coat, imitating the surface of the stone.

German Carmine.—Cochineal, 1 lb.; water, 7 gals.; boil for 5 minutes, then add alum, 1 oz. Boil for 5 minutes more, filter and set aside the decoction in glass or porcelain vessels for 3 days, then decant the liquor and dry the carmine in the shade. The remaining liquor will still deposit an inferior quality by standing.

Stain for Floors.—To strong lye of wood-ashes add enough copperas for the required oak shade. Put this on with a mop and varnish afterwards.

Lead Color for Iron.—Take litharge and place it over a fire in a ladle; sprinkle over it flour of brimstone to turn it dark; grind it in oil. It dries quick and stands well in any weather.

A Good Imitation of Gold.—Mix white lead, chrome yellow and burnt sienna until the proper shade is obtained.

Beautiful White Paint—For inside work, which ceases to smell, and dries in a few hours. Add 1 lb. of frankincense to 2 qts. turpentine; dissolve it over a clear fire, strain it, and bottle it for use; then add 1 pt. of this mixture to 4 pts. bleached linseed oil, shake them well together, grind white lead in spirits of turpentine, and strain it; then add sufficient of the lead to make it proper for painting; if too thick in using, thin with turpentine, it being suitable for the best internal work on account of its superiority and expense.

For a Pure White Paint.—Nut oil is the best; if linseed oil is used, add one-third of turpentine.

To Mix Common White Paint.—Mix or grind white lead in linseed

oil to the consistency of paste; add turpentine in the proportion of 1 quart to the gallon of oil; but these proportions must be varied according to circumstances. Remember to strain your color for the better sorts of work. If the work is exposed to the sun, use more turpentine for the ground-color, to prevent its blistering.

To Give Lustre to a Light Blue Ground.—After the letters are written and dry, paint the ground over again, between the letters, with the same color, and while wet take pulverized Prussian blue and sift over the surface; glass, frost, or smalts may be used instead of, or with the blue. When dry, brush off the loose particles.

Invisible Green for Outside Work.—Mix lampblack and French yellow with burnt white vitriol. These colors mix in boiled oil. Burnt vitriol is the best drier for greens, as it is powerful and colorless, and, consequently, will not injure the color.

Bright Varnish Green, for Inside Blinds, Fenders, &c.—The work must first be painted over with a light lead color, and, when dry, grind some white lead in spirits of turpentine; afterwards take about one-third in bulk of verdigris, which has been ground stiff in linseed oil; then mix them both together, and put into a little resin varnish, sufficient only to bind the color. When this is hard, which will be the case in 15 minutes, pour into the color some resin to give it a good gloss. Then go over the work a second time, and, if required, a third time. Thus you will have a cheap and beautiful green, with a high polish. It possesses a very drying quality, as the work may be completed in a few hours. The tint may be varied according to taste, by substituting mineral green for verdigris; and if a bright grass-green is required, add a little Dutch pink to the mixture. N.B.—This color must be used when quite warm, to give the varnish a uniform extension.

Compound Greens.—This is a mixture of whiting, indigo and Dutch pink, the intensity of which may be increased or diminished by the addition of blue or yellow. These mixtures will not admit of any fixed rules in regard to the quantities of the matters used in their composition. They must depend on the taste of the artist and the tone he is desirous of giving to the color.

Pea Green.—Take 1 lb. of genuine mineral green, 1 lb. of the precipitate of copper, 1½ lbs. of blue verditer, 3 lbs. of white lead, 3 oz. of sugar of lead, and 3 oz. of burnt white vitriol. Mix the whole of these ingredients in linseed oil, and grind them quite fine. It will produce a bright mineral pea-green paint, preserve a blue tint, and keep any length of time in any climate, without injury, by putting water over it. To use this color for house or ship painting, take 1 lb. of the green paint with some pale boiled oil, mix them well together, and this will produce a strong pea-green paint. The tint may be altered at pleasure, by adding a proportionate quantity of white lead to the green, which may be ground in linseed oil, and thinned with spirits of turpentine for use. It may also be used for painting Venetian window blinds, by adding white lead and mixing the color with boiled oil. For all the aforesaid preparations it will retain a blue tint, which is very desirable.

Vermilion.—To prevent vermilion from fading, add to the dry color, before mixing, one-eighth part of flour of sulphur. Light English vermilion is used for striping, ornamenting, or lettering; the deep vermilion having less body, will not cover good. English vermilion gives the best color on carriage work when mixed with rubbing varnish and oil. American vermilion should not be ground, as the process would change it to an orange color; while green, Indian red, chrome yellow, and all heavy body colors, are all the better for being ground as fine as possible. Raw oil is preferable to boiled, as it is more volatile, and penetrates and fills the pores of the wood better.

Compound Colors—62 Tints—*Blue.*—Grind Prussian blue in turps, other blue, very fine in linseed oil; mix with white paint to the color re-

quired. *Straw.*—A mixture of chrome yellow and white lead, oil and turps. *Steel.*—Mix ceruse, Prussian blue, fine lac, and vermilion, with oil and turps. *Purple.*—White lead, Prussian blue and vermilion, with oil and turps. *French Grey.*—White lead and Prussian blue tinged with vermilion, and for the last coat substitute carmine or lake for vermilion. *Drab.*—White lead with a little Prussian blue and French yellow, linseed oil and turps. *Another Drab.*—White lead with a little Prussian blue and lampblack, linseed oil and turps. *Dark Red, for common purposes.*—Mix English Venetian red, in boiled oil, with a little red lead and litharge, to give a drying quality. *Lighter Red.*—Mix together equal parts of Venetian red, and red lead in boiled oil and turps. *Imitation of Vermilion.*—Grind together, in oil, red lead and rose pink. *Deep Red.*—Mix in oil vermilion with a dust of Venetian red, or red lead. *Unfading Orange.*—This is a mixture of orange lead (orpiment) and French or stone yellow, oil and turps. *Bright Yellow, for floors.*—White lead and linseed oil, mixed with some French yellow, and a little chrome yellow to heighten it, some red lead, burnt white vitriol and litharge, added to give it a drying quality. This color mixed with equal parts of boiled oil and turpentine, and used very thin. *Dark Yellow.*—Mix French yellow in boiled oil, adding to it a little red lead or litharge to give the paint a drying quality. *Light Yellow.*—This is a mixture of French yellow and white lead, with oil and turpentine. *Another.*—French yellow, white lead and red lead. *Another.*—This is a mixture of Prussian blue, French yellow, a small portion of Turkey umber, and a little burnt vitriol. Ground the same way. *Another, in oil.*—Mix Prussian blue and chrome yellow. Ground the same. *Another Shade.*—A mixture of Prussian blue and French yellow, with a small quantity of white lead and Turkey umber; add burnt vitriol, ground the same. *Another, light.*—White mixed with verdigris. A variety of shades may be obtained by using blue and yellow with white lead. *Another, Olive.*—Black and blue mixed with yellow, in such quantities as to obtain the colors or shades required. For *distemper,* use indigo and yellow pink mixed with whiting or white lead powder. *Freestone Color.*—A mixture of red lead, Venetian red, French yellow, and lampblack (varying the shade according to taste,) with linseed oil and turpentine. *Olive Green.*—Grind, separately, Prussian blue and French yellow, in boiled oil, then mix to the tints required with a little burnt white vitriol to act as a dryer. A cheap and handsome color for outside work, such as doors, carts, wagons, railings, &c. *Light Grey* is made by mixing white lead with lampblack, using more or less of each material as you wish to obtain a lighter or a darker shade. *Buff* is made from yellow ochre and white lead. *Silver or Pearl Grey.*—Mix white lead, Prussian blue, and a very slight portion of black, regulating the quantities you wish to obtain. *Flaxen Grey* is obtained by a mixture of white lead and Prussian blue, with a small quantity of lake. *Brick color.*—Yellow ochre and red lead, with a little white. *Oak Wood Color.*—$\frac{3}{4}$ white lead and $\frac{1}{4}$ part umber and yellow ochre, proportions of the last two ingredients being determined by the desired tints. *Walnut-tree Color.*—$\frac{2}{3}$ white lead, and $\frac{1}{3}$ red ochre, yellow ochre, and umber, mixed according to the shade sought. If veining is required, use different shades of the same mixture, and for the deepest places, black. *Jonquil.*—Yellow, pink, and white lead. This color is only proper for distemper. *Lemon Yellow.*—Realgar and orpiment. The same color can be obtained by mixing yellow pink with Naples yellow; but it is then only fit for distemper. *Orange Color.*—Red lead and yellow ochre. *Violet Color.*—Vermilion, or red lead, mixed with black or blue, and a small portion of white. Vermilion is preferable to red lead in mixing this color. *Purple.*—Dark red mixed with violet color. *Carnation.*—Lake and white. *Gold Color.*—Massicot, or Naples yellow, with a small quantity of realgar, and a very little Spanish white. *Olive Color* may be obtained by black and a little blue, mixed with yellow. Yellow-pink, with a little verdigris and lampblack; also ochre and a small quantity of white will produce an olive color. For *distemper,* indigo and yellow-pink, mixed with white lead or Spanish white, must be used. If veined, it must be done with umber. *Chestnut*

Color.—Red ochre and black, for a dark chestnut. To make it lighter, employ a mixture of yellow ochre. *Light Timber Color.*—Spruce ochre, white, and a little umber. *Flesh Color.*—Lake, white lead, and a little vermilion. *Light Willow Green.*—White, mixed with verdigris. *Grass Green.*—Yellow-pink mixed with verdigris. *Stone Color.*—White, with a little spruce ochre. *Dark Lead Color.*—Black and white, with a little Prussian blue. *Fawn Color.*—White lead, stone ochre, with a little vermilion. *Chocolate Color.*—Lampblack and Spanish brown. On account of the fatness of lampblack, mix some litharge and red lead. *Portland Stone Color.*—Umber, yellow ochre, and white lead. *Rose Color.*—White lead and carmine or lake. *Salmon Color.*—White lead and blue, yellow, and red. *Pearl Color.*—White lead, Prussian blue, and red. *Slate Color.*—White lead, black, red, and blue. *Pea Green.*—White lead and Chrome, or Paris green. *Cream Color.*—White lead, yellow and red. *Straw Color.*—White lead and yellow. *Peach Blossom Color.*—White lead and vermilion. *Brown.*—Venetian red and lampblack. *Dark Green.*—Lampblack and chrome green. *Olive Color.*—Red, green, or black, yellow and red. *Snuff Color.*—Yellow, sienna, and red.

Spirit Graining for Oak.—Two pounds of whiting, quarter of a pound of gold size, thinned down with spirits of turpentine; then tinge your whiting with Vandyke brown and raw sienna, ground fine. Strike out your lights with a fitch dipped in turpentine, tinged with a little color to show the lights. If your lights do not appear clear, add a little more turpentine. Turpentine varnish is a good substitute for the above mentioned. This kind of graining must be brushed over with beer, with a clean brush, before varnishing. Strong beer must be used for glazing up top-graining and shading.

Oil for Graining Oak.—Grind Vandyke brown in turpentine, and as much gold size as will set, and as much soft soap as will make it stand the comb. Should it set too quickly, add a little boiled oil. Put a teaspoonful of gold size to half a pint of turpentine, and as much soap as will lie on a twenty-five cent piece, then take a little soda mixed with water and take out the veins.

To Prepare The Ground for Oak Rollers.—Stain your white lead with raw sienna and red lead, or with chrome yellow and Venetian red; thin it with oil and turps, and strain for use. When the ground work is dry, grind in beer, Vandyke brown, whiting and a little burnt sienna, for the graining color; or you may use raw sienna with a little whiting, umbers, &c.

To Imitate Old Oak.—To make an exceedingly rich color for the imitation of old oak, the ground is a composition of stone ochre, or orange chrome, and burnt sienna; the graining color is burnt umber or Vandyke brown, to darken it a little. Observe that the above colors must be used whether the imitation is in oil or distemper. When dry, varnish.

To Imitate Old Oak, in Oil.—Grind Vandyke and whiting in turpentine, add a bit of common soap to make it stand the comb, and thin it with boiled oil.

To Imitate Pollard Oak.—The ground color is prepared with a mixture of chrome yellow, vermilion, and white lead, to a rich light buff. The graining colors are Vandyke brown and small portions of raw and burnt sienna and lake ground in ale or beer. Fill a large tool with color, spread over the surface to be grained, and soften with the badger hair brush. Take a moistened sponge between the thumb and finger, and dapple round and round in kind of knobs, then soften very lightly; then draw a softener from one set of knobs to the other while wet, to form a multiplicity of grains, and finish the knots with a hair pencil, in some places in thicker clusters than others. When dry put the top grain on in a variety of directions, and varnish with turps and gold size; then glaze up with Vandyke and strong ale. To finish, varnish with copal.

To Imitate Mottled Mahogany.—The ground is prepared with the

best English Venetian red, red lead, and a small portion of white lead. The graining colors are burnt sienna, ground in ale, with a small portion of Vandyke brown, sufficient to take away the fiery appearance of the sienna. cover the surface to be grained, soften with the badger hair brush, and while wet take a mottling-roller and go over the lights a second time, in order to give a variety of shade, then blend the whole of the work with the badger softener. Put the top grain on with the same color. When dry varnish.

To Imitate Rosewood.—Mix vermilion and a small quantity of white lead for the ground. Take rose pink, tinged with a little lampblack, or Vandyke brown, and grind very fine in oil, then take a flat graining brush, with the hairs cut away at unequal distances, and cut down the grain as if wending round a knot. When nearly dry, take a graining comb that is used for oak, and draw down the grain. This will give it the appearance of nature. When dry, varnish. *Another.*—The ground color is prepared with vermilion and small quantities of white lead and crimson lake. When the ground is dry and made very smooth, take Vandyke brown, ground in oil, and with a small tool spread the color over the surface in different directions forming kind of knots. Before the work is dry, take a piece of leather, and with great freedom strike out the light veins having previously prepared the darkest tint of Vandyke brown, or gum asphaltum, immediately take the flat graining brush with few hairs in it, draw the grain over the work and soften. When varnished the imitation will be excellent.

Another Rosewood Imitation in Size.—Mix Venetian red, white lead powder, vermilion and common size, the consistency of which, when cold, must be that of a weak trembling jelly. With this composition paint the work twice over. When the ground is dry, take some lampblack, finely ground in beer, and beat the white of an egg into it; take the flat graining brush, dipped in the black, and put on the grain. When dry, stain the first coat of varnish with rose pink, finely ground in turpentine, and finish the work by giving it a coat of clear varnish.

To Imitate Bird's eye Maple.—The ground is a light buff, prepared with white lead, chrome yellow, and a little vermilion or English Venetian red, to take off the rawness of the yellow. The graining color is equal parts of raw umber and sienna ground in oil to the proper consistency. Spread the surface of the work with this color, and, having some of the same prepared a little thicker, immediately take a sash tool or sponge, and put on the dark shades, and soften with the badger's-hair brush before the color is dry, put on the eyes by dabbing the dotting machine on the work. When dry, put on the grain with the camel's-hair pencil on the prominent parts, to imitate the small hearts of the wood. When dry, varnish.

To Imitate Curled Maple.—Prepare a light yellow for the ground, by mixing chrome yellow and white lead, tinged with Venetian red. The graining color is a mixture of equal portions of raw sienna and Vandyke, ground in ale; spread the surface to be grained in an even manner; then with a piece of cork rub across the work to and fro, to form the grains which run across the wood. When dry, varnish.

Curled Maple in Oil for Outside Work.—Prepare a rich ground by mixing chrome yellow, white lead and burnt sienna. For the graining color, grind equal parts of raw sienna and umber with a little burnt copperas in turpentine, and mix with a small quantity of grainer's cream. Thin the color with boiled oil; then fill a tool and spread the surface even, and rub on the lights with the sharp edge of a piece of buff leather, which must now and then be wiped to keep it clean; soften the edges of the work very lightly, and when dry, put on the top grain with burnt umber and raw sienna, ground in ale, with the white of an egg beat into it. When dry, varnish.

Satinwood.—This ground is prepared with white lead, stone ochre, and small quantities of chrome yellow and burnt sienna. The graining color is

one-third of raw sienna and whiting, ground in pale ale, very thin; then spread the color over the surface to be grained. While wet, soften, and have ready a wet roller or mottling brush, in order to take out the lights; blend the whole with a badger's-hair brush. When the work is dry, take the flat brush, and with the same color, put on the top again. When dry, varnish.

To Imitate Yew-Tree.—The ground is a reddish buff. For the graining color grind in ale equal portions of Vandyke brown and burnt sienna, with a small quantity of raw sienna. When the ground is dry, spread the surface even with the color, and soften; then with a piece of cork with a sharp edge, rub the work cross and cross in order to form the fine grain. When dry, dip the tip of your fingers in the graining color to form the eyes or knots, and put in the small touches with a camel's-hair pencil. When dry, put on the top grain, and when this is dry, varnish.

To Imitate Black and Gold Marble.—This description of marble is now in great demand. The ground is a deep jet black, or a dead color, in gold size, drop black and turps: second coat, black japan. Commence veining; mix white and yellow ochre with a small quantity of vermilion to give a gold tinge; dip the pencil in this color, and dab on the ground with great freedom some large patches, from which small threads must be drawn in various directions. In the deepest parts of the black, a white vein is sometimes seen running with a great number of small veins attached to it; but care must be taken that these threads are connected with, and run in some degree in the same direction with the thicker veins. If durability is not an object and the work is required in a short time, it may be executed very quick in distemper colors, and when varnished, it will look well.

Red Marble.—For the ground, put on a white tinged with lake or vermilion; then apply deep rich reds in patches, filling up the intermediate spaces with brown and white mixed in oil; then blend them together; if in quick drying colors, use about half turps and gold size. When dry, varnish; and while the varnish is wet, put in a multitude of the fine white threads, crossing the whole work in all directions, as the wet varnish brings the pencil to a fine point.

Jasper Marble.—Put on a white ground lightly tinged with blue; then put on patches of rich reds or rose pink, leaving spaces of the white grounds; then partly cover those spaces with various browns to form fossils, in places running veins; then put in a few spots of white in the centre of some of the red patches, and leaving in places masses nearly all white. When dry, use the clearest varnish.

Blue and Gold Marble.—For the ground put on a light blue; then lake blue, with a small piece of white lead and some dark common blue, and dab on the ground in patches, leaving portions of the ground to shine between; then blend the edges together with duster or softener; afterwards draw on some white veins in every direction, leaving large open spaces to be filled up with a pale yellow or gold-paint; finish with some fine white running threads, and a coat of varnish at last.

To Imitate Granite.—For the ground color, stain your white lead to a light lead color, with lampblack and a little rose pink. Throw on black spots, with a graniting machine, a pale red, and fill up with white before the ground is dry.

Another.—A black ground; when half dry, throw in vermilion, a deep yellow and white spots.

To Imitate Hair Wood.—For the ground color, take white lead and thin it with turpentine, and slightly stain it with equal quantities of Prussian blue and lampblack. For the graining color, grind in ale a mixture of Prussian blue and raw sienna; when the ground is dry, spread a transparent coat of the graining color on the surface of the work, and soften; then with the cork, mottle by rubbing it to and fro across the work, to form the fine long grain or mottle. When this is done, soften and top grain in wavy but perpendicular directions; varnish when dry.

Inlaid Mother-of-Pearl Work, on sewing machines and other fancy work, is performed by selecting the thin scales of the shell and cementing them to the surface of the material; the rest of the surface is covered with successive coats of Japan varnish, generally black, being subjected to a baking process after each application. When the varnish is as thick as the shell, it is polished, the gilding and painting added and a flowing coat of varnish put over the whole.

Another Method.—Prepare the job with a heavy coat of black Japan, then, before it is dry, procure flakes of pearl and lay them on the black surface, pressing them into the Japan until they are level with the surface; then with colors form vines and flowers, allowing the pearl to form the body of the flower leaf, and shade up all nicely.

To Imitate Tortoise Shell.—Paint a ground of salmon color; then when dry and smoothed off, coat it over with rose pink, mixed in varnish and turpentine; then with a flat piece of glass, press on the surface, and remove the glass quickly, being careful not to push it over the paint so as to disturb the curious figures which the pressure will form thereon. Varnish when dry, and you will find you have a beautiful imitation of tortoise shell.

Fancy Figures on Wood.—Slake some lime in stale urine. Dip a brush in it, and form, on the wood, figures to suit your fancy. When dry, rub it well with a rind of pork.

Stains for Wood.—1. *Cheap Black Walnut Stain.*—Burnt umber, 2 parts; rose pink, 1 part; glue, 1 part; water sufficient; heat all together and dissolve completely, apply to the work first with a sponge, then go over it with a brush, and varnish over with shellac. 2. *Ebony Stain.*—Drop black, 2 parts; rose pink, 1 part; turpentine, a sufficient quantity. 3 *Bright Yellow Stain.*—1. Brush over with the tincture of turmeric. 4. Warm the work and brush it over with weak aqua-fortis; varnish or oil as usual. 5. A very small bit of aloes put into the varnish will give a rich yellow color to the wood. 6. *Extra Black Stain for Wood.*—Pour 2 quarts boiling water over 1 oz. of powdered extract of logwood, and, when the solution is effected, 1 dr. of yellow chromate of potash is added, and the whole well stirred. It is then ready for use as a wood-stain, or for writing ink. When rubbed on wood it produces a pure black. Repeat with 2, 3, or 4 applications till a deep black is produced. 7. *Imitation of Mahogany.*—Let the first coat of painting be white lead, the second orange, and the last burnt umber or sienna: imitating the veins according to your taste and practice. 8. *To Imitate Wainscot.*—Let the first coat be white; the second, half white and yellow ochre; and the third yellow ochre only; shadow with umber or sienna. 9. *To Imitate Satin Wood.*—Take white for your first coating, light blue for the second, and dark blue or dark green for the third. 10. *Rosewood Stain, very bright shade—Used Cold.*—Take alcohol, 1 gal.; camwood, 2 oz.; set them in a warm place 24 hours; then add extract of logwood, 3 oz.; aquafortis, 1 oz.; and when dissolved it is ready for use; it makes a very bright ground like the most beautiful rosewood; 1, 2 or more coats as you desire. 11. *Cherry Stain.*—Rain water, 3 qts; annatto, 4 oz.; boil in a copper kettle till the annatto is dissolved, then put in a piece of potash the size of a walnut; keep it on the fire about half an hour longer, and it is ready to bottle for use. 12. *Rosewood Stain, very bright shade.*—Equal parts of logwood and redwood chips, boil well in water sufficient to make a strong stain; apply it to the furniture while hot; 2 or 3 coats according to the depth of color desired. 13. *Rose Pink Stain, and Varnish.*—Put 1 oz. of potash in 1 qt. of water, with red sanders, 1½ ozs.; extract the color from the wood and strain: then add gum shellac, ½ lb., dissolve it by a brisk fire. Used upon logwood stain for rosewood imitation. 14. *Blue Stain for Wood.*—1. Dissolve copper filings in aqua-fortis, brush the wood with it, and then go over the work with a hot solution of pearlash (2 oz. to 1 pt. of water) till it assumes a perfectly blue color. 15. Boil 2 ozs. of indigo, 2 lbs. wood, and 1 oz. alum, in 1 gal. water, brush well over until thoroughly stained.

16. *Imitation of Botany-Bay Wood.*—Boil ½ lb. French berries (the unripe berries of the *Rhamnus infectorius*) in 2 qts. water till of a deep yellow, and while boiling hot, give 2 or 3 coats to the work. If a deeper color is desired, give a coat of logwood decoction over the yellow. When nearly dry, form the grain with No. 8 *black stain*, used hot, and, when dry, rust and varnish. 17. *Mahogany color.—Dark.*—1. Boil ½ lb. of madder and 2 ozs. of logwood chips in a gallon of water, and brush well over while hot; when dry go over the whole with pearlash solution, 2 drs. to the quart. 2. Put 2 ozs. dragon's blood, bruised, into a quart of oil of turpentine; let the bottle stand in a warm place, shake frequently, and, when dissolved, steep the work in the mixture. 18. *Box-wood Brown Stain.*—Hold your work to the fire, that it may receive a gentle warmth; then take aquafortis, and, with a feather, pass it over the work till you find it change to a fine brown (always keeping it near the fire), you may then varnish or polish it. 19. *Light Red Brown.*—Boil ½ lb. madder and ½ lb. fustic in 1 gal. water; brush over the work, when boiling hot, until properly stained. 20. The surface of the work being quite smooth, brush over with a weak solution of aqua-fortis, ½ oz. to the pint; then finish with the following:—Put 4½ ozs. dragon's blood, and 1 oz. soda, both well bruised, to 3 pts. spirits of wine, let it stand in a warm place, shake frequently, strain and lay on with a soft brush, repeating until of a proper color, polish with linseed oil or varnish. 21. *Purple*—Brush the work several times with the logwood decoction used for *No.* 6 *black*; and, when dry give a coat of pearl-ash solution, 1 dr. to a quart; lay it on evenly. 22. *Red.*—1. Boil 1 lb. Brazil wood and 1 oz. pearlash in a gal. of water; and while hot, brush over the work until of a proper color. Dissolve 2 ozs. alum in 1 qt. water, and brush the solution over the work before it dries. 23. Take a gallon of the above stain, add 2 ozs. more pearlash; use hot, and brush over with the alum solution. 24. Use a cold solution of archil, and brush over with the pearl-ash solution for *No.* 1 *Dark Mahogany.* 25. *Mahogany Stain on Wood.*—Take nitric acid, dilute with 10 parts of water, and wash the wood with it. To produce *rosewood* finish, glaze the same with carmine of Munich lake. Asphaltum thinned with turpentine, forms an excellent mahogany color on new work. 26. *Mahogany Stain on Maple.*—Dragon's blood, ½ oz.; alkanet, ¼ oz.; aloes, 1 dr.; spirits of wine, 16 ozs.; apply it with a sponge or brush. 27. *Crimson Stain for Musical Instruments.*—Ground Brazil wood, 1 lb.; water, three qts.; cochineal, ½ ounce, boil the Brazil with the water for an hour, strain, add the cochineal; boil gently for half an hour, when it will be fit for use. If you wish a *scarlet tint*, boil an ounce of saffron in a quart of water, and pass over the work before you stain it. 28 *Purple Stain.*—Chipped logwood 1 lb.; water, 3 qts.; pearlash, 4 ozs.; powdered indigo, 2 ounces. Boil the logwood in the water half an hour, add the pearlash and indigo, and when dissolved, you will have a beautiful purple. 29. *Green Stain.*—Strong vinegar, 3 pts.; best verdigris, 4 ounces, ground fine; sap green, ½ ounce; mix together.

Black Stains for Wood.—1. Drop a little sulphuric acid into a small quantity of water; brush over the wood and hold it to the fire; it will be a fine black and receive a good polish. 2. For a beautiful black on wood, nothing can exceed the *black Japan* mentioned under Tinsmith's Department. Apply two coats; after which, varnish and polish it. 3. To 1 gal. vinegar, add a quarter of a pound of iron rust; let it stand for a week; then add a pound of dry lampblack, and three-quarters of a pound copperas; stir it up for a couple of days. Lay on five or six coats with a sponge, allowing it to dry between each; polish with linseed oil and a soft woollen rag, and it will look like ebony. Incomparable for iron work, ships' guns, shot, &c. 4. Vinegar, ½ gal.; dry lampblack, ½ lb.; iron-rust sifted, 3 lbs.; mix and let stand for a week. Lay three coats of this on hot, and then rub with linseed oil and you will have a fine deep black. 5. Add to the above stain, nut-galls, 1 oz.; logwood chips, ½ lb.; copperas, ¼ lb.; lay on three coats; oil well, and you will have a black stain that will stand any

kind of weather. and is well adapted for ships' combings, &c. 6. Logwood chips, ½ lb.; Brazil wood, ¼ lb.; boil for 1½ hours in 1 gal. water. Brush the wood with this decoction while hot; make a decoction of nut-galls, by gently simmering, for three or four days, a quarter of a pound of the galls in 3 qts. water; give the wood three coats, and, while wet, lay on a solution of sulphate of iron (2 ozs. to a quart), and when dry, oil or varnish. 7. Give three coats with a solution of copper fillings in aqua-fortis, and repeatedly brush over with the logwood decoction until the greenness of the copper is destroyed. 8. Boil ½ lb. logwood chips in 2 quarts of water; add an ounce of pearlash, and apply hot with a brush. Then take 2 qts. of the logwood decoction, and ½ oz. of verdigris, and the same of copperas; strain and throw in ½ lb. of iron-rust. Brush the work well with this and oil.

Black Walnut Stain.—Spirits of turpentine, 1 gal.; pulverized asphaltum, 2 lbs.; dissolve in an iron kettle on a stove, stirring constantly. Can be used over a red stain to imitate rosewood. To make a perfect black add a little lamp-black. The addition of a little varnish with the turpentine improves it.

Miscellaneous Stains.—*Yellow* is produced by diluted nitric acid. *Red* is produced by a solution of dragon's blood in spirits of wine. *Black*, is produced by a strong solution of nitric acid. *Green* is produced by a solution of verdigris in nitric acid; then dipped in a hot solution, pearl-ash produces a *Blue stain*. *Purple* is produced by a solution of sal-ammoniac in nitric acid.

To Improve the Color of Stains.—Nitric acid, 1 oz.; muriatic acid, ¼ teaspoonful; grain tin, ¼ oz.; rain water, 2 oz. Mix it at least 2 days before using, and keep your bottle well corked.

To Ebonize Wood.—Mix up a strong stain of copperas and logwood to which add powdered nut-gall. Stain your wood with this solution, dry-rub down well, oil, then use French polish made tolerably dark with indigo or finely powdered stone blue.

Etching on Glass.—Druggists' bottles, bar-tumblers, signs, and glassware of every description, can be lettered in a beautiful style of art, by simply giving the article to be engraved, or etched, a thin coat of the engraver's varnish (see next receipt), and the application of fluoric acid. Before doing so, the glass must be thoroughly cleaned and heated, so that it can hardly be held. The varnish is then to be applied lightly over, and made smooth by dabbing it with a small ball of silk, filled with cotton. When dry and even, the lines may be traced on it by a sharp steel, cutting clear through the varnish to the glass. The varnish must be removed clean from each letter, otherwise it will be an imperfect job. When all is ready, pour on or apply the fluoric acid with a feather, filling each letter. Let it remain until it etches to the required depth, then wash off with water, and remove the varnish.

Etching Varnish.—Take of virgin wax and asphaltum, each 2 oz.; of black pitch and Burgundy pitch, each ½ oz.; melt the wax and pitch in a new earthenware glazed pot, and add to them, by degrees, the asphaltum, finely powdered. Let the whole boil, simmering gradually, till such time as, taking a drop upon a plate, it will break when it is cold, or bending it double two or three times betwixt the fingers. The varnish, being then boiled enough, must be taken off the fire, and, after it cools a little, must be poured into warm water that it may work the more easily with the hands, so as to be formed into balls, which must be kneaded, and put into a piece of taffety for use. The sand blast is now in extensive use for ornamenting on glass.

Fluoric Acid, to Make for Etching Purposes.—You can make your own fluoric (sometimes called hydro-fluoric) acid, by getting the fluor or Derbyshire spar, pulverizing it, and putting all of it into sulphuric acid which the acid will cut or dissolve. Inasmuch as fluoric acid is destructive to glass, it cannot be kept in common bottles, but must be kept in lead or gutta percha bottles.

Glass-Grinding for Signs, Shades, &c.—After you have etched a name or other design upon uncolored glass, and wish to have it show off to better advantage by permitting the light to pass only through the letters, you can do so by taking a piece of flat brass sufficiently large not to dip into the letters, but pass over them when gilding upon the surface of the glass; then, with flour of emery, and keeping it wet, you can grind the whole surface very quickly, to look like the ground-glass globes often seen upon lamps, except the letter, which is eaten below the general surface.

To Drill and Ornament Glass.—Glass can be easily drilled by a steel drill, hardened but not drawn, and driven at a high velocity. Holes of any size, from the 16th of an inch, upwards, can be drilled, by using spirits of turpentine as a dirp; and, easier still, by using camphor with the turpentine. Do not press the glass very hard against the drill. If you require to ornament glass by turning in a lathe, use a good mill file and the turpentine and camphor drip and you will find it an easy matter to produce any shape you choose.

Gilding Glass Signs, &c.—Cut a piece of thin paper to the size of your glass, draw out your design correctly in black lead-pencil on the paper, then prick through the outline of the letters with a fine needle; tie up a little dry white lead in a piece of rag; this is a pounce-bag. Place your design upon the glass, right side up, dust it with the pounce-bag; and, after taking the paper off, the design will appear in white dots upon the glass; these will guide you in laying on the gold on the oposite side, which must be *well cleaned* preparatory to laying on the gold. *Preparing the size.*—Boil perfectly clean water in an enamelled saucepan, and while boiling, add 2 or 3 shreds of best selected isinglass, after a few minutes strain it through a clean linen rag; when cool, it is ready for use. *Clean the glass perfectly.*—When this is done, use a flat camel's-hair brush for laying on the size; and let it drain off when you put the gold on. When the gold is laid on perfectly dry, take a ball of the finest cotton wool and gently rub or polish the gold; you can lay on another coat of gold if desirable, it is now ready for writing. In doing this, mix a little of the best vegetable black with black japan; thin with turpentine to proper working consistency; apply this when thoroughly dry; wash off the superfluous gold, and shade as in sign writing.

Glass Gilding, Another Method.—Clean and dry the glass thoroughly, then lay out the lines for letters with a piece of hard scented soap, then paint the letters on the *right* side of the glass with lampblack mixed with oil, in order to *form a guide for the work*, then on the inside lay on a coat of the size mentioned in the preceding receipt, using a camel's-hair brush, covering the whole of the letters; next lay on the gold leaf with a tip, until every part of the letter is covered well. Let the leaf remain until the size is dry, when you will find that the letters on the front side can be easily seen and traced. This is done with quick drying black, mixed with a little varnish. Paint over the whole directly over the gold; allow it to dry; then wipe off with soap and water the lampblack letters from the front side; with pure cold water and a clean sponge, wash the superfluous gold leaf and size from the back, and you will have a splendid gold letter on the glass; next, shade your letter to suit the taste, always remembering to shade to the edge of the gold, for then you have only *one* edge to make straight. The other edge may be left rough, and when dry may be straightened by scraping with a knife.

Ornamental Designs on Glass.—In making scrolls, eagles, etc., on glass, some painters put on the outlines and shades first, and then lay the gold leaf over all; another good way is to scratch the shades on to the gold leaf after it is dry, and put the colors on the back of the gold. Silver leaf may be used in the same manner as gold, but it will not wear as well. A very pretty letter may be made by incorporating silver with gold; take paper and cut any fancy design to fit the parts of the letter; stick it on the size before laying the leaf, allowing it to dry and wash off as before; then with a penknife raise the paper figure, and the exact shape or form of the

figure will be found cut out of the gold letter; clean off nicely, apply more size, and lay *silver* leaf to cover the vacant spots; wash off when dry, and a very handsome letter will be the result. Colors may be used instead of silver, if desired, or a silver letter edged or "cut up" with gold, will look well.

Glass and Porcelain Gilding.—Dissolve in linseed oil an equal weight either of copal or amber; add as much oil of turpentine as will enable you to apply the compound or size thus formed, as thin as possible, to the parts of the glass intended to be gilt. The glass is to be placed in a stove till it will almost burn the fingers when handled; at this temperature the size becomes adhesive, and a piece of gold leaf, applied in the usual way, will immediately stick. Sweep off the superfluous portions of the leaf, and when quite cool it may be burnished; taking care to interpose a piece of India paper between the gold and the burnisher.

Drilling China, Glass, &c.—To drill china use a copper drill and emery, moistened with spirits of turpentine. To drill glass, use a steel drill, tempered as hard as possible and camphor and water as a lubricant.

Gold Lustre for Stoneware, China, &c.—Gold, 6 parts; aqua-regia, 36 parts. Dissolve, then add tin, 1 part; next add balsam of sulphur, 3 parts; oil of turpentine, 1 part. Mix gradually into a mortar, and rub it until the mixture becomes hard; then add oil of turpentine, 4 parts. It is then to be applied to a ground prepared for the purpose.

Gilding China and Glass.—Powdered gold is mixed with borax and gum-water, and the solution applied with a camel's-hair pencil. Heat is then applied by a stove until the borax fuses, when the gold is fixed and afterwards burnished.

Painting on Glass.—Take clear resin, 1 oz.; melt in an iron vessel. When it is melted, let it cool a little, but not harden; then add oil of turpentine sufficient to keep it in an liquid state. When cold, use it with colors ground in oil.

Instructions for Sign Writing, with Colors to be used for Ground and Letters.—On an oak ground, ornamental letters, in ultramarine blue, filled in with gold and silver leaf, blocked up and shaded with burnt sienna. *Another.*—Gold letters on a white marble ground, blocked up and shaded with a transparent brown or burnt sienna. *On glass.*—Gold letters, shaded with burnt sienna. *Another.*—Gold letters, shaded with black, on a scarlet or chocolate ground. On a rich blue ground, gold letters, double shaded, black and white. White letters on a blue ground, shaded with black, look very well. On a purple ground, pink letters, shaded with white. Mix ultramarine and vermilion for a ground color, white letters shaded with a light grey. Vermilion ground, chrome yellow, stained with vermilion and lake, for the letters, shaded black. A substitute for the above colors: Rose pink and red lead; and for the letters, stone yellow, white lead and Venetian red. A good substitute for gold is obtained by grinding white lead, chrome yellow, and a dust of vermilion together. Mix your colors for writing in boiled oil, and use for drier gold size. Other good grounds for gold letters are: blues, vermilion, lake, and Saxon. When your sign is ready for gilding, follow the directions given under the head of "*To Gild Letters on Wood.*"

To Gild Letters on Wood, &c.—When your sign is prepared as smooth as possible, go over it with a sizing made by white of an egg dissolved in about four times its weight in cold water, adding a small quantity of fuller's earth, this is to prevent the gold sticking to any part but the letters. When dry, set out the letters and commence writing, laying on the size as thinly as possible, with a sable pencil. Let it stand till you can barely feel a slight stickiness, then go to work with your gold leaf, knife, and cushion, and gild the letters. Take a leaf up on the point of your knife, after giving it a slight puff into the back part of your cushion, and spread it on the front part of the cushion as straight as possible, giving it another slight puff with your mouth to flatten it out. Now cut it into the proper size, cutting with the heel of your knife forwards. Now rub the tip lightly on

your hair; take up the gold on the point, and place it neatly on the letters when they are all covered get some very fine cotton wool, and gently rub the gold until it is smooth and bright. Then wash the sign with clean water to take off the egg size. *See Gilding on Wood.*

GILDING ON WOOD.—To gild in *oil*, the wood, after being properly prepared, is covered with a coat of *gold size*, made of drying linseed oil mixed with yellow ochre; when this has become so dry as to adhere to the fingers without soiling them, the gold leaf is laid on with great care and dexterity, and pressed down with cotton wool; places that have been missed are covered with small pieces of gold leaf, and when the whole is dry, the ragged bits are rubbed off with the cotton. This is by far the easiest mode of gilding; any other metallic leaves may be applied in similar manner. *Pale leaf gold* has a greenish yellow color, and is an alloy of gold and silver. Dutch gold leaf is only copper leaf colored with the fumes of zinc; being much cheaper than true gold leaf, it is very useful when large quantities of gilding are required in places where it can be defended from the weather, as it changes color if exposed to moisture; and it should be covered with varnish. *Silver leaf* is prepared every way the same as gold leaf; but when applied, should be kept well covered with varnish, otherwise it is liable to tarnish; a transparent yellow varnish will give it the appearance of gold. Whenever gold is fixed by means of linseed oil, it will bear washing off, which burnished gold will not.

SUPERFINE SIZE FOR GILDING.—Good drying oil, 2 lbs.; pure gum animi, powdered, 4 ozs.; bring the oil almost to the boiling point in a covered metal pot, add your gum gradually and cautiously to the oil, stirring all the time to dissolve completely. Boil to a tarry consistency and strain while warm through silk into a warm bottle with a wide mouth; keep it well corked; use as required, thinning with turpentine. This is the celebrated Birmingham "secret size," and is unequalled for tenacity and durability. *Size to fix the Pearl on Glass Signs.* 1. Copal varnish, 1 part; Canada balsam, 2 parts. 2. Pure mastic varnish. 3. Pale, quick-drying copal varnish.

GILDERS' GOLD SIZE.—Drying or boiled linseed oil, thickened with yellow ochre, or calcined ochre, and carefully reduced to the utmost smoothness by grinding. Thin with oil of turpentine.

FRENCH BURNISHED GILDING.—*Encollage*, or glue coat.—To a decoction of wormwood and garlic in water, strained through a cloth; a little common salt and some vinegar are added, then mixed with as much good glue; and the mixture spread in a hot state with a brush of boar's hair. When plaster or marble is gilded, leave out the salt. The first glue coating is made thinner than the second. 2. *White preparation* consists in covering the above surface with 8, 10 or 12 coats of Spanish white, mixed up with strong size; each well worked on with the brush. 3. *Stop* up the pores with thick whiting and glue, and smooth the surface with dog-skin. 4. *Polish* the surface with pumice stone and very cold water. 5. *Retouch* the whole in a skilful manner. 6. *Cleanse* with a damp linen rag, and then a soft sponge. 7. *Rub* with a horse's tail (*shave-grass*) the parts to be yellowed, to make them softer. 8. *Yellow* with *yellow ochre* carefully ground in water, and mixed with transparent colorless size. Use the thinner part of the mixture with a fine brush. 9. Next rub the work with shave-grass to remove any granular appearance. 10. *Gold water size* consists of Armenian bole, 1 lb.; bloodstone (hematite), 2 oz.; and as much galena; each separately ground in water. Then mix altogether with a spoonful of olive oil. This is tempered with a white sheepskin glue, clear and well strained. Heat, and apply three coats with a fine long-haired brush. 11. *Rub* with a clean dry linen cloth except the parts to be burnished, which are to receive other 2 coats of the gold size, tempered with glue. 12. The surface damped with cold water (iced in summer), has then the *gold leaf* applied to it. Gild the *hollow* ground before the more prominent parts; water being dexterously applied by a soft brush, immediately behind the gold leaf, before laying it down; removing an excess of water with a dry brush. 13. *Burnish* with bloodstone. 14. Next

pass a thin coat of glue, slightly warmed, over the parts that are not to be burnished. 15. Next moisten any broken points with a brush, and apply bits of gold leaf to them. 16. Apply the *vermeil* coat very lightly over the gold leaf with a soft brush. It gives lustre and fire to the gold, and is made as follows; annatto, 2 oz.; gamboge, 1 oz.; vermilion, 1 oz.; dragon's blood, ½ oz.; salt of tartar, 2 oz.; saffron, 18 grs.; boil in 2 English pints of water, over a slow fire, till it is reduced to a fourth; then pass the whole through a silk or muslin sieve. 17. Next pass over the dead surfaces a second coat of deadening glue, hotter than the first. This finishes the work, and gives it strength.

Bronzing or Gilding Wood.—Pipeclay, 2 oz.; Prussian blue, patent yellow, raw umber, lampblack, of each, 1 oz.; grind separately with water on a stone and as much of them as will make a good color put into a small vessel ¾ full of size. The wood, being previously cleaned and smoothed, and coated with a mixture of clean size and lampblack, receives a new coating twice successively with the above compound, having allowed the first to dry. Afterwards the bronze powder is to be laid on with a pencil, and the whole burnished or cleaned anew, observing to repair the parts which may be injured by this operation; next the work must be coated over with a thin layer of Castile soap, which will take the glare off the burnishing, and afterwards be carefully rubbed with a woollen cloth. The superfluous powder may be rubbed off when dry.

Mosaic Gold Powder for Bronzing, &c.—Melt 1 lb. tin in a crucible, add ½ lb. of purified quicksilver to it; when this is cold, it is reduced to powder, and ground, with ¼ lb. sal-ammoniac and 7 oz. flour of sulphur, till the whole is thoroughly mixed. They are then calcined in a matrass; and the sublimation of the other ingredients leaves the tin converted into the mosaic gold powder which is found at the bottom of the glass. Remove any black or discolored particles. The sal-ammoniac must be very white and clear, and the mercury of the utmost purity. When a deeper red is required, grind a very small quantity of red lead with the above materials. *True Gold Powder.*—Put some gold leaf, with a little honey, or thick gum water made with gum arabic, into an earthen mortar, and pound the mixture till the gold is reduced to very small particles; then wash out the honey or gum repeatedly with warm water, and the gold in powder will be left behind. When dry it is fit for use. *Dutch Gold Powder* is made from Dutch gold leaf, which is sold in books at a very low price. Treat in the manner described above for true gold powder. When this inferior powder is used, cover the gilding with a coat of clear varnish, otherwise it will soon lose its bright appearance. *Copper Powder* is prepared by dissolving filings or slips of copper with nitrous acid in a receiver. When the acid is saturated, the slips are to be removed; or, if filings be employed, the solution is to be poured off from what remains undissolved. Small bars are then put in, which will precipitate the copper powder from the saturated acid; and the liquid being poured from the powder, this is to be washed clean off the crystals by repeated waters.

Bronze Powder of a *pale gold* color is produced from an alloy of 13¼ parts of copper and 2¾ parts zinc, of a *crimson metallic* lustre from copper, of a *pale* color, and a very little zinc, *green* bronze with a proportion of verdigris, of a fine *orange* color, by 14½ parts copper and 1¾ parts zinc; another orange color, 13¾ parts copper and 2 ¼ parts zinc. The alloy is laminated into very fine leaves with careful annealing, and these are levigated into impalpable powders, along with a film of fine oil, to prevent oxidizement, and to flavor the levigation.

General Directions for Bronzing.—The choice of the above powders is of course determined by the degree of brilliancy you wish to obtain. The powder is mixed with strong gum water or isinglass, and laid on with a brush or pencil; and, not so dry as to have still a certain clamminess, a piece of soft leather wrapped round the finger is dipped in the powder, and rubbed over the work. When the work has been all covered with the

bronze, it must be left to dry, and any loose powder then cleared away by a hair-pencil.

Bronzing Iron.—The subject should be heated to a greater degree than the hand can bear, and German gold mixed with a small quantity of spirit of wine varnish, spread over it with a pencil; should the iron be already polished, you must heat it well, and moisten it with a linen rag dipped in vinegar.

Dyes for Veneers.—*A fine Black.*—Put 6 lbs. of logwood chips into your copper, with as many veneers as it will hold without pressing too tight, fill it with water, let it boil slowly for about 3 hours, then add ½ lb. of *powdered verdigris*, ½ lb. copperas, bruised gall-nuts, 4 ozs.; fill the copper up with vinegar as the water evaporates; let it boil gently 2 hours each day till the wood is dyed through. *A fine Blue.*—Put oil of vitriol, 1 lb., and 4 ozs. of the best powdered indigo in a glass bottle. Set it in a glazed earthen pan, as it will ferment. Now put your veneers into a copper or stone trough; fill it rather more than one-third with water, and add as much of the vitriol and indigo (stirring it about) as will make fine blue, testing it with a piece of white paper or wood. Let the veneers remain till the dye has struck through. Keep the solution of indigo a few weeks before using it; this improves the color. *Fine Yellow.*—Reduce 4 lbs. of the root of barberry to dust by sawing, which put in a copper or brass trough; add turmeric, 4 ozs.; water, 4 gals.; then put in as many white holly veneers as the liquor will cover. Boil them together 3 hours, often turning them. When cool, add aquafortis, 2 ozs., and the dye will strike through much sooner. *Bright Green.*—Proceed as in the previous recipe to produce a yellow; but, instead of aquafortis, add as much of the vitriolated indigo (see above, under blue dye) as will produce the desired color. *Bright Red.*—Brazil dust, 2 lbs.; add water, 4 gals. Put in as many veneers as the liquid will cover; boil them for 3 hours, then add alum, 2 ozs., aqua-fortis, 2 ozs.; and keep it luke-warm until it has struck through. *Purple.*—To 2 lbs. of chip logwood and ½ lb. Brazil dust, add 4 gals. of water; and after putting in your veneers, boil for 3 hours; then add pearlash, 9 ozs., and alum, 2 oz.; let them boil for 2 or 3 hours every day till the color has struck through. *Orange.*—Take the veneers out of the above yellow dye, while still wet and saturated, transfer them to the bright red dye till the color penetrates throughout.

Strong Glue for Inlaying or Veneering.—Select the best light brown glue, free from clouds and streaks. Dissolve this in water, and to every pint add half a gill of the best vinegar and ½ oz. of isinglass. For other glues see *Engineers' Department.*

Beautiful Varnish for Violins, &c.—Rectified spirits of wine, ½ gal.; add 6 oz. gum sandarac, 3 oz. gum mastic, and ¼ pint turpentine varnish; put the above in a tin can by the stove, frequently shaking till well dissolved: strain and keep for use. If you find it harder than you wish, thin with more turpentine varnish.

Another.—Heat together at a low temperature 2 qts. of alcohol, ½ pint turpentine varnish, and 1 lb. clean gum mastic; when the latter is thoroughly dissolved, strain through a cloth.

Varnish for Frames, etc.—Lay the frames over with tin or silver foil by means of plaster of Paris, glue or cement of some kind, that the foil may be perfectly adherent to the wood; then apply your gold lacquer varnish, which is made as follows: Ground turmeric, 1 lb.; powdered gamboge, 1½ ounces; powdered sandarac, 3½ lbs.; powdered shellac, ¾ lbs.; spirits of wine, 2 gals.; dissolve and strain; then add turpentine varnish, 1 pint; and it is ready for use.

Banner Painting.—Lay out the letters very accurately with charcoal or crayon, then saturate the cloth with water to render the painting easy. On large work a stencil will be found useful. Take a piece of tin, lay the straight edge to the mark, brush over with a sash tool, and by this means you will make a very clean-edged letter. Use stiff bristle pencils in painting on canvas.

Oil Cloth Painting.—To paint canvas for floors, the canvas should first be saturated with glue-water or flour paste, and allowed to dry first, then paint it with any color desired. To put in the figures, cut out designs in tin plates or stiff paper, and stencil them on in various colors.

To Imitate Marble.—*For white marble*, get up a pure white ground, then hold a lighted candle near the surface, and allow the smoke to form the shades and various tints desired. This will make a very handsome imitation. *Black* marble imitation is made by streaking a black surface with colors, using a feather and pencil. Another plan is to get up a smooth black surface: then take the colors, green, yellow, red, white, &c., ground thick in gold size, and streak the surface with a stick or pencil. Allow it to dry, and apply a heavy coat of lampblack and yellow ochre, mixed with rough stuff. When all is hard, rub down to a level surface with lump pumice-stone, varnish, and a beautiful variegated marble will be the result.

To Repair the Silvering of Mirrors.—Pour upon a sheet of tin foil 3 drs. of quicksilver to the square foot of foil. Rub smartly with a piece of buckskin until the foil becomes brilliant. Lay the glass upon a flat table, face downwards, place the foil upon the damaged portion of the glass, lay a sheet of paper over the foil, and place upon it a block of wood or a piece of marble with a perfectly flat surface; put upon it sufficient weight to press it down tight; let it remain in this position a few hours. The foil will adhere to the glass.

To Silver Looking Glasses.—A sheet of tin-foil corresponding to the size of the plate of glass is evenly spread on a perfectly smooth and solid marble table, and every wrinkle on its surface is carefully rubbed down with a brush: a portion of mercury is then poured on, and rubbed over the foil with a clean piece of soft woollen stuff, after which, two rules are applied to the edges, and mercury poured on to the depth of a crown piece; when any oxide on the surface is carefully removed, and the sheet of glass, perfectly clean and dry, is slid along over the surface of the liquid metal so that no air, dirt, or oxide can possibly either remain or get between them. When the glass has arrived at its proper position, gentle pressure is applied, and the table sloped a little to carry off the waste mercury; after which it is covered with flannel, and loaded with heavy weights; in twenty-four hours it is removed to another table, and further slanted, and this position is progressively increased during a month, till it becomes perpendicular.

To attach Glass or Metal Letters to Plate Glass.—Copal varnish, 15 parts; drying oil, 5 parts; turpentine, 3 parts; oil of turpentine, 2 parts; liquefied glue, 5 parts. Melt in a water bath and add 10 parts of slaked lime.

Varnishes.—*Common Oil Varnish.*—Resin, 4 lbs.; beeswax, ½ lb.; boiled oil, 1 gallon; mix with heat; then add spirits of turpentine, 2 quarts. *Chinese Varnish.*—Mastic, 2 oz.; sandarac, 2 oz.; rectified spirits, 1 pt.; close the matrass with bladder, with a pinhole for the escape of vapor; heat to boiling in a sand or water bath, and when dissolved, strain through linen. *Metallic Varnish for Coach Bodies.*—Asphaltum, 56 lbs.; melt, then add litharge, 9 lbs.; red lead, 7 lbs. Boil, then add boiled oil 12 gals.; yellow resin, 12 lbs. Again boil until, in cooling, the mixture may be rolled into pills; then add spts. of turpentine, 30 gals.; lampblack, 7 lbs. Mix well. *Mastic Varnish.*—Mastic, 1 lb.; white wax, 1 oz.; spirits turpentine, 1 gallon; reduce the gums small; then digest it with heat in a close vessel till dissolved. *Turpentine Varnish.*—Resin, 1 lb.; boiled oil, 1 lb.; melt; then add turpentine, 2 lbs. Mix well. *Pale Varnish.*—Pale African copal, 1 part; fuse. Then add hot pale oil, 2 parts. Boil the mixture till it is stringy; then cool a little, and add spirits of turpentine, 3 parts. *Lacquer Varnish.*—A good lacquer is made by coloring lac varnish with turmeric and annatto. Add as much of these two coloring substances to the varnish as will give the proper color; then squeeze the varnish, through a cotton cloth when it forms lacquer. *Gold Varnish.*—Digest shellac, sixteen parts, gum sandarac, mas-

tic, of each three parts; crocus, one part; gum gamboge, two parts; all bruised, with alcohol, one hundred and forty-four parts. Or, digest seed lac, sandarac, mastic, of each eight parts; gamboge, two parts; dragon's blood, one part; white turpentine, six parts; turmeric, four parts; bruised with alcohol, one hundred and twenty parts. *Deep Gold-Colored Lacquer.*—Seed lac, 3 oz.; turmeric, 1 oz.; dragon's blood, one-fourth ounce; alcohol, 1 pt.; digest for a week, frequently shaking; decant, and filter. Lacquers are used upon polished metals and wood to impart the appearance of gold. If yellow is required, use turmeric, aloes, saffron or gamboge; for red, use annatto, or dragon's blood, to color. Turmeric, gamboge, and dragon's blood generally afford a sufficient range of colors. *Gold Lacquer.*—Put into a clean 4 gal. tin, 1 lb. of ground turmeric, 1½ oz. of gamboge, 3½ lbs. powdered gum sandarac, ¾ pound of shellac, and 2 gals. of spirits of wine. When shaken, dissolved, and strained, add 1 pint of turpentine varnish, well mixed. *Varnish for Tools.*—Take tallow, 2 ozs.; resin, 1 oz.; and melt together. Strain while hot, to get rid of specks which are in the resin; apply a slight coat on your tools with a brush, and it will keep off rust for any length of time. *Gold Varnish.*—Turmeric, 1 drachm; gamboge, 1 drachm; turpentine, 2 pints; shellac, 5 ozs.; dragon's blood, 8 drachms; thin mastic varnish, 8 oz.; digest with occasional agitation for 14 days; then set aside to fine, and pour off the clear. *Beautiful Pale Amber Varnish.*—Amber, pale and transparent, 6 lbs.; fuse; add hot clarified linseed oil, 2 gals.; boil till it strings strongly, cool a little, and add oil of turpentine, 4 gals. This soon becomes very hard and is the most durable of oil-varnishes. When wanted to dry quicker, drying oil may be substituted for linseed, or "driers" may be added during the cooling. *Black Coach Varnish.*—Amber, 1 lb.; fuse; add hot *drying* oil, ½ pt.; powdered black resin and Naples asphaltum, of each 3 ozs. When properly incorporated and considerably cooled, add oil of turpentine, 1 pt. *Body Varnish.*—Finest African copal, 8 lbs.; fuse carefully; add clarified oil, 2 gals.; boil gently for 4½ hours, or until quite stringy; cool a little, and thin with oil of turpentine, 3½ gals. *Dries slowly. Carriage Varnish.*—Sandarac, 19 ozs.; pale shellac, 9½ ozs.; very pale transparent resin, 12½ oz.; turpentine, 18 oz.; 85 per cent. alcohol, 5 pts.; dissolve. Used for the internal parts of carriage, &c. Dries in ten minutes. *Cabinet-makers' Varnish.*—Very pale shellac, 5 lbs.; mastic, 7 ozs.; alcohol, 90 per cent., 5 or 6 pts.; dissolve in the cold with frequent stirring. Used for French polishing, &c. *Japanners' Copal Varnish.*—Pale African copal, 7 lbs.; fuse; add clarified linseed oil, ½ gal.; boil five minutes, remove it into the open air, add boiling oil of turpentine, 2 gals.; mix well, strain it into the cistern, and cover it up immediately. Used to varnish furniture, and by japanners, coach-makers, &c. *Copal Varnish.*—Pale hard copal, 8 lbs.; add hot and pale drying oil, 2 gals.; boil till it strings strongly, cool a little, and thin with hot rectified oil of turpentine, 3 gals.; and strain immediately into the store can. Very fine. *Gold Varnish of Watin, for Gilded Articles.*—Gum lac in grains, gamboge, dragon's blood, and annatto, of each 12½ oz.; saffron, 3¼ oz. Each resin must be dissolved separately in 5 pts. of 90 per cent. alcohol, and 2 separate tinctures must be made with the dragon's blood and annatto in a like quantity of spirits; and a proper proportion of each mixed together to produce the required shade. *Transparent Varnish for Ploughs,* &c.—Best alcohol, 1 gal.; gum sandarac, 2 lbs.; gum mastic, ½ lb.; place all in a tin can which admits of being corked; cork tight, shake it frequently, occasionally placing the can in hot water. When dissolved, it is ready for use. *Fine Black Varnish for Coaches.*—Melt in an iron pot, amber, 32 ozs.; resin, 6 ozs.; asphaltum, 6 ozs.; drying linseed oil, 1 pt.; when partly cooled, add oil of turpentine, warmed, 1 pint. *Mordant Varnish.*—Dissolve 1 oz. mastic, 1 oz. sandarac, ½ oz. gum gamboge, and ¼ oz. turpentine in 6 ozs. spirits turpentine. One of the simplest mordants is that procured by dissolving a little honey in thick glue. It has the effect of greatly heightening the color of the gold, and the leaf sticks extremely well. *Changing Varnish. —To imitate Gold or Silver, &c.* Put ½ oz. best gum gamboge into 32 oz.

spirits of turpentine ; 4 oz. dragon's blood into 3 ozs. spirits of turpentine ; and 1 oz. of annatto into 8 ozs. spirits of turpentine, making the 3 mixtures in different vessels. Keep them in a warm place, exposed to the sun as much as possible, for about 2 weeks, when they will be fit for use. Add together such quantities of each liquor as the nature of the color you are desirous of obtaining will point out. *Transparent Varnish, for Wood.*—Best alcohol, 1 gal. ; nice gum shellac, 2½ lbs. Place the jug or bottle in a situation to keep it just a little warm, and it will dissolve quicker than if hot, or left cold. *Patent Varnish for Wood or Canvas.*—Take spirits of turpentine, 1 gal. ; asphaltum, 2¼ lbs. ; put them into an iron kettle which will fit upon a stove, and dissolve the gum by heat. When dissolved and a little cool add copal varnish, 1 pt. ; and boiled linseed oil, 1 pt. ; when cold, it is ready for use. Perhaps a little lampblack would make it a more perfect black.

Black Varnish for Coal Buckets.—Asphaltum, 1 lb. ; lampblack, ¼ lb. ; resin, ½ lb. ; spirits of turpentine, 1 qt. Dissolve the asphaltum and resin in the turpentine, then rub up the lampblack with linseed oil, only sufficient to form a paste, and mix with the other. Apply with a brush.

Varnish for Iron.—Asphaltum, 8 lbs. ; melt in an iron kettle, slowly adding boiled linseed oil, 5 gals. ; litharge, 1 lb. ; and sulphate of zinc, ½ lb. ; continuing to boil for 3 hours ; then add dark gum amber, 1½ lbs. ; continue to boil for 2 hours longer. When cool, reduce to a proper consistence to apply with a brush, with spirits of turpentine.

Varnish for smooth moulding Patterns.—Alcohol, 1 gal. ; shellac, 1 lb. ; lamp or ivory black, sufficient to color it.

Varnish for Boilers.—Asphaltum dissolved in turpentine.

Varnish for Baskets.—Take either red, black, or white sealing-wax, whichever color you wish to make ; to every two ounces of sealing-wax, add one ounce of spirit of wine, pound the wax fine, then sift it through a fine lawn sieve, till you have made it extremely fine, put it into a large phial with spirits of wine, shake it, let it stand near the fire forty-eight hours, shaking it often ; then with a little brush, rub your baskets all over with it, let them dry, and do them over a second time.

Varnish for Cardwork.—Before varnishing cardwork, it must receive two or three coats of size, to prevent the absorption of the varnish and any injury to the design. The size may be made by dissolving a little isinglass in hot water, or by boiling some parchment cuttings until dissolved. In either case the solution must be strained through a piece of clean muslin, and for very nice purposes should be clarified with a little white of egg. A small clean brush, called by painters a sash tool, is the best for applying the size, as well as the varnish. A light delicate touch must be adopted especially for the first coat, lest the ink or color be started or smothered.

Varnish for Drawings.—Boil some parchment in clear water, in a glazed pipkin, until it becomes a fine clear size ; strain and keep it for use ; give your work two coats, observing to do it quickly and lightly. When dry, apply the varnish.

Varnish for Grates.—Melt four pounds of common asphaltum, and add two pints of linseed oil, and one gallon of oil of turpentine. This is usually put up in stoneware bottles for sale, and is used with a paint brush. If too thick, more turpentine may be added.

Varnish for Paper Hangings.—The cheapest kind is ordinary turpentine varnish, which can be bought for three shillings a gallon. Another kind is paper or crystal varnish, the price of which is six shillings per gallon, but owing to the great proportion of turpentine which these contain, they are not to be depended on for use.

Milk Paint, for Barns, any Color.—Mix water lime with skim milk, to a proper consistence to apply with a brush, and it is ready to use. It will adhere well to wood, whether smooth or rough, to brick, mortar, or stone, where oil has not been used (in which case it cleaves to some extent), and forms a very hard substance, as durable as the best oil paint. It is too cheap to estimate, and any one can put it on who can use a brush. Any

color may be given to it, by using colors of the tinge desired. If a red is preferred, mix Venetian red with milk, not using any lime. It looks well for fifteen years.

PAINT.—TO MAKE WITHOUT LEAD OR OIL.—Whiting, 5 lbs.; skimmed milk, 2 qts.; fresh slaked lime, 2 ozs. Put the lime into a stoneware vessel, pour upon it a sufficient quantity of the milk to make a mixture resembling cream; the balance of the milk is then to be added; and lastly, the whiting is to be crumbled upon the surface of the fluid, in which it gradually sinks. At this period it must be well stirred in or ground, as you would other paint, and it is fit for use.

PARIS GREEN.—Take unslaked lime of the best quality, slake it with hot water; then take the finest part of the powder, and add alum water as strong as it can be made, sufficient to form a thick paste; then color it with bichromate of potash and sulphate of copper until the color suits your fancy, and dry it for use. N.B.—The sulphate of copper gives a blue tinge; the bichromate of potash, a yellow. Observe this, and you will get it right.

BEAUTIFUL GREEN PAINT FOR WALLS.—Take 4 lbs. Roman vitriol, and pour on it a teakettleful of boiling water. When dissolved, add 2 lbs. pearlash, and stir the mixture well with a stick until the effervescence ceases; then add ¼ lb. pulverized yellow arsenic, and stir the whole together. Lay it on with a paint brush; and if the wall has not been painted before, 2 or even 3 coats will be requisite. If a pea-green is required, put in less, if an apple-green, more, of the yellow arsenic. This paint does not cost the quarter of oil paint, and looks better.

BLUE COLOR FOR CEILINGS, &C.—Boil slowly for 3 hours 1 lb. blue vitriol and ½ lb. of the best whiting in about 3 qts. water; stir it frequently while boiling, and also on taking it off the fire. When it has stood till quite cold, pour off the blue liquid, then mix the cake of color with good size, and use it with a plasterer's brush in the same manner as whitewash, either for walls or ceilings.

PAINTING IN MILK.—Skimmed milk, ½ gallon; newly slaked lime, 6 oz.; and 4 oz. of poppy, linseed, or nut oil; and 3 lbs. Spanish white. Put the lime into an earthen vessel or clean bucket; and having poured on it a sufficient quantity of milk to make it about the thickness of cream, add the oil in small quantities a little at a time, stirring the mixture well. Then put in the rest of the milk, afterwards the Spanish white finely powdered, or any other desired color. For out-door work add 2 oz. each more of oil and slaked lime, and 2 oz. of Burgundy pitch dissolved in the oil by a gentle heat.

PREMIUM PAINT WITHOUT OIL OR LEAD.—Slake stone-lime with boiling water in a tub or barrel to keep in the steam; then pass 6 quarts through a fine sieve. Now to this quantity add 1 quart of coarse salt, and a gallon of water; boil the mixture, and skim it clear. To every five gallons of this skimmed mixture, add 1 lb. alum; ½ lb. copperas; and by slow degrees ¾ lb. potash, and 4 quarts sifted ashes or fine sand; add any coloring desired. A more durable paint was never made.

GREEN PAINT FOR GARDEN STANDS, BLINDS, &C.—Take mineral green, and white lead ground in turpentine, mix up the quantity you wish with a small quantity of turpentine varnish. This serves for the first coat. For the second, put as much varnish in your mixture as will produce a good gloss. If you desire a brighter green, add a little Prussian blue, which will much improve the color.

TO BLEACH OIL.—Pour as much linseed oil into a shallow earthen vessel as will stand one inch deep, then pour in 6 inches of water, cover with a fine cloth, and let the whole stand in the sun for a few weeks until the liquid becomes thick, when it should be poured into a phial and submitted to a gentle heat; after which the clear is to be poured off and strained through a flannel cloth.

MIXTURE TO REMOVE OLD PAINT.—Dissolve 1 lb. potash in 3 pts. water over the fire, then add yellow ochre or some common dry paint until it is as

thick as rough stuff; spread this over your old paint, and after a little it will come off quite easily, then wash the wood with soap and water to remove all the potash, dry off and sand-paper, then give a coat of clean raw oil. Another method is to heat a heavy piece of iron and apply to the paint, which will cause it to become loose and soft, so that it may be scraped off with a knife. Still another method is to direct the flame of a spirit lamp (which may be constructed for the purpose) on the old paint, scraping it off as it softens.

Porcelain Colors.—The following are some of the colors used in the celebrated porcelain manufactory of Sêvres, and the proportions in which they are compounded. Though intended for porcelain painting, nearly all are applicable to painting on glass. Flux No. 1. Minum or red lead, 3 parts; white sand, washed, 1 part. This mixture is melted, by which it is converted into a greenish-colored glass. Flux No. 2. *Grey flux.*—Of No. 1, 8 parts; fused borax in powder, 1 part. This mixture is melted. Flux No. 3. *For carmines and Green.*—Melt together fused borax, 5 parts; calcined flints, 3 parts; pure minum, 1 part. No. 1. *Indigo blue.*—Oxide of cobalt, 1 part; flux No. 3, 2 parts. *Deep azure blue.*—Oxide of cobalt, 1 part; oxide of zinc, 2 parts; flux No. 3, 5 parts. No. 2. *Emerald Green.*—Oxide of copper, 1 part; antimonic acid, 10 parts; flux No. 1, 30 parts. Pulverize together, and melt. No. 3. *Grass green.*—Green oxide of chromium, 1 part; flux No. 3, 3 parts. Triturate and melt. No. 4. *Yellow.*—Antimonic acid, 1 part; subsulphate of the peroxide of iron, 8 parts; oxide of zinc, 4 parts; flux No. 1, 36 parts. Rub up together and melt. If this color is too deep the salt of iron is diminished. No. 5. *Fixed yellow for touches.*—No. 4, 1 part; white enamel of commerce, 2 parts. Melt and pour out; if not sufficiently fixed, a little sand may be added. No. 6. *Deep Nankin yellow.*—Subsulphate of iron, 1 part; oxide of zinc, 2 parts; flux No. 2, 8 parts. Triturate without melting. No. 7. *Deep Red.*—Subsulphate of iron, calcined in a muffle until it becomes of a beautiful capucine red, 1 part; flux No. 2, 3 parts. Mix without melting. No. 8. *Liver Brown.*—Oxide of iron made of a red brown, and mixed with three times its weight of flux No. 2. A tenth of sienna earth is added to it, if it is not deep enough. No. 9. *White.*—The white enamel of commerce in cakes. No. 10. *Deep Black.*—Oxide of cobalt, 2 parts; copper, 2 parts; oxide of manganese, 1 part; flux No. 1, 6 parts; fused borax, ½ part. Melt, and add oxide of manganese, 1 part; oxide of copper, 2 parts. Triturate without melting. *The application.*—Follow the general directions given in another part of this work, in relation to staining glass.

How to Write on Glass in the Sun.—Dissolve chalk in aqua-fortis to the consistency of milk, and add to that a strong dissolution of silver. Keep this in a glass decanter well stopped. Then cut out from a paper the letters you will have appear, and paste the paper on the decanter or jar, which you are to place in the sun in such a manner that its rays may pass through the spaces cut out of the paper, and fall on the surface of the liquor. The part of the glass through which the rays pass will turn black, whilst that under the paper will remain white. Do not shake the bottle during the operation. Used in lettering jars.

Colored Potter's Glazings.—*White:* prepare an intimate mixture of 4 parts of massicot, 2 of tin ashes, 3 fragments of crystal glass, and ½ part of sea salt. The mixture is suffered to melt in earthenware vessels, when the liquid flux may be used. *Yellow:* take equal parts of massicot, red lead, and sulphuret of antimony, calcine the mixture, and reduce it again to powder, add then 2 parts of pure sand, and 1½ parts of salt; melt the whole. *Green:* 2 parts of sand, 3 parts massicot, 1 part of salt and copper scales, according to the shade to be produced; melt and use. *Violet:* 1 part massicot, 3 parts sand, 1 of smalt, ½ part of black oxide of manganese; melt. *Blue:* white sand and massicot, equal parts; blue smalt, ⅛ part; melt. *Black:* black oxide of manganese, 2 parts; smalt, ¼ part; burned quartz, 1 part; massicot, 1¼ parts; melt. *Brown:* green bottle glass, 1 part; manganese, 1 part; lead, 2 parts; melt.

Useful Hints For Carriage Painters.—It is usual to apply three coats of oil paint as a priming to commence with, and it is safe to use, say ⅔ drying oil and ⅓ turpentine, with a little fine litharge ground in, about 2 ozs. to every 20 lbs. of paint. This hardens the priming better than patent dryer, and works better under the sand-paper, When the first coating is hard and dry, rub down with your sand-paper and be sure to make perfectly level work among the irregularities, deficiencies and ridges on the surface of your work.

Next dust your work carefully, and with your putty knife go over the whole surface and putty up every crevice, split, crack or knot-hole with the hard drying putty hereafter mentioned. Be very careful not to overlook the slightest flaw, but bring every spot to a true and perfect level. Now dust off the work again, preparatory to a second coating. Thin your color with turpentine, if too stout or thick, but do not use thin color, for it neither covers well, nor rubs down well. For dark colors, use a dark lead color for the oil coats, but, for preparing for such a color as light green, let the color be light lead color, if for a yellow, begin with white, or slightly tinted with chrome yellow.

Be careful with your second coat, to lay it fair, regular, and equal, over each and every part of the work, and when it is thoroughly dry, rub down with a finer quality of sand-paper than the last, being careful to make the surface perfectly smooth and even. Now commence to give the third coat, (after dusting off), putting on the paint not too lavishly, but rub it out well.

The next step, when the last is hard and dry, is to apply the filling up coats. For a good composition see receipt for *"Rough Stuff"* for carriage work. Another good filling consists of dry French yellow, a small quantity of white lead, the same amount of whiting, a little red lead, about one-sixteenth of litharge, and of drying Japan enough to nearly mix it, put in a very little drying oil, and turpentine to thin to a suitable thickness to make it spread like a stiff coat of paint. Thin so that it can be applied easily, and flow on full and free. Apply this composition, giving the body, shafts, wheels, springs, &c., a good coat, levelling off any hollows &c., existing in the parts, and when this coat becomes perfectly hard give it another. The next step, after this last coat dries hard, is to rub it down with lump pumice-stone, first rubbing the pumice flat upon a stone before commencing to use it. In rubbing down with lump pumice use plenty of water, freely supplied from the sponge in your left hand; be very cautious to avoid cutting through, and feel the parts frequently as the work progresses, to ascertain when all is sufficiently smooth and hard, then with your sponge wash off the work nicely, and with your wash leather wrung out, dry it off clean and smooth.

The next step is to paint the carriage. See to it that your colors are freshly ground, your paint mill, pots, tins, brushes, &c., perfectly clean. Apply your color the proper thickness, expeditiously and neatly, so that the work will present a good clean appearance. The following directions will be found useful in mixing the designated colors. *Dark Green, Olive Shade.* Take deep chrome yellow and powdered drop black, mix in a pot with the drying Japan, and a little turpentine, grind all together, test to be sure that the color is right, if wished lighter, add more chrome yellow, if darker, more drop black, grade the color to the proper thickness, and apply at once. Two coats will be required. *Ultramarine blue.* For your ground color, grind good Prussian blue in oil, and add to white lead as much of the blue as will make it sufficiently dark to form a ground for the ultramarine blue, two coats of this will be required. When hard and dry, grind some of the best ultramarine blue on the stone with a quantity of varnish, add enough of this to your body flowing varnish to impart the right color. Two good coats of this beautiful color will be necessary; use sugar of lead as a dryer. Before giving the second coat rub down with ground pumice and water, using a cloth; the next coat will flow all the better for this treatment. After a few

days rub down again with ground pumice and water, wash, and dry with your chamois skin, when the work will be ready for picking out and striping. *Claret or Lake.* Vermilion and rose pink, in oil, same as the last, for first coat. When hardened dry, give another light coat, previously rubbing down with ground pumice and water, as directed for blue. For a rich light claret be sparing of your rose pink in the ground color; for dark claret, use more rose pink. For darker shades use more rose pink in the ground color, then use the best crimson lake, same way as for the light claret, two good coats will do. For a purple shade of claret use vermilion, rose pink, a spice of ultramarine blue, for a ground color. Then add the proper quantity of ground purple lake to body flowing varnish, and apply two coats. *Japan Brown.* Grind drop black in Japan, using enough vermilion to be visible. *Chrome Greens.* Grind your greens in Japan, or use greens composed of chrome yellow and Prussian blue. *Carmine Color on Fire Engines, &c. Cheap Method.* For a ground, use the best English vermilion, then add pure carmine, ground in a little drying oil, to your body flowing varnish, and apply two coats carefully. This method extends the precious color so that an ounce will suffice for a carriage or machine. *Oxford Brown.* Use a little chrome yellow, India red, best ochre, white lead, burnt umber, just white enough to be seen; yellow is the leading color; red to warm it, and umber to impart the brown shade. *Rich Purple.* Vermilion and Prussian blue, with a little white, a very cheap, nice color. *Fawn Color.* Use yellow, red, a little black, a little terra de sienna, or burnt umber may be added to obtain the right shade. *Drab Color.* White and raw umber form a cool drab which may be varied with chrome, or red, as may be desired. *Plum Brown.* Drop black and vermilion makes a very good color at a cheap rate.

To Copy an Ornament.—Place the paper or other article containing the ornament against a pane of glass; then laying a sheet of thin paper over it, you can copy it exactly with a lead pencil.

Ornaments, in the shape of decalcomanie or other gilded pictures may be easily transferred to carriages or coaches by following the directions given in transferring pictures. See further on.

Striping or "Picking out," for Carriage Work.—Creat care is required in this part of the work to carry a steady hand so that the lines may be drawn equidistant, clean and neat. For fine lines, grind the color in drying oil, as it makes the best work. Japan color will do for broad or coarse lines, *on blue* ground. If a large carriage, with heavy wheels, draw lines with Frankfort-black, Japan mixed color from three-quarter inch to one inch broad, on all parts of the carriage wheels, springs, spokes, hubs, &c., then draw fine lines of light orange or light primrose color, about three-eighths or a quarter inch from the broad black line, with one fine line around the edges of the black nuts and bolt heads. On superior work, pure white, gold, or deep orange lines may be drawn down the middle of the black lines producing a very fine effect; *on greens,* pick out with black, if a light green, black lines will be sufficient, if desired better, run up the centre of the black lines with white, not too fine. On dark green, pick out with black, running very fine lines on each side of the black three-eighths of an inch off the black. This also sets off a very bright green to good advantage. *On Clarets,* pick out with black, with vermilion, or rich orange fine side lines, or light orange side lines with vermilion line run up the centre of the black; or light gold line up the centre of one large black line. *On Oxford Brown,* pick out with black, fine line with vermilion or medium tint of chrome yellow with slight tint of red in it; or part the black line with white, down the centre. *On Fawn Colors,* pick out with broad black, fine line with white on each edge, or brown drab shade. *On Japan or Plum Browns,* vermilion line has the best appearance. *On Olives or Quakers' Greens,* pick out with black, with white for fine lines, or orange or light green. *On Drabs,* pick out with black, fine line with vermilion, or high colored orange, or white centre line for extra finish. *On Purple,* pick out with black, fine line with a bright tint of orange or vermilion.

Varnishing of Coaches and Carriages.—In this, as well as in the painting department, absolute cleanliness is indispensable, as regards brushes, pots, freedom from dust, &c., When your work is ready, if it is the under carriage, apply a good full coat of carriage varnish, and when through with this part of the process, go over it again, this time using body varnish. After it is hard and dry proceed to "flat" the work by lightly removing the gloss with ground pumice, water, and a woollen cloth, being careful not to cut into the lines or ground; then clean away all the pumice, and dry off nicely with the chamois leather slightly wet. If you have cut through in any part, repair with Japan color previous to second coating. Let your second coat be very full and well laid on, but be careful that it does not run. A very superior gloss will be obtained on the wheels, if after the application of a good coat you spin them until the varnish is nearly set.

If the second coat is not satisfactory, repeat the flattening process with your pumice, cloth and water, clean off as before and varnish again.

In more costly polished work, commence with the very finest ground pumice or Tripoli, rub until you bring the work to a very smooth state, then wash off very clean and nice, dry and dust well. Use every precaution against dust, by sweeping and sprinkling your floor in every stage of polishing and varnishing. The next step in polishing is to use a fine cloth for a rubber, rotten-stone sifted fine through muslin, and mixed with olive oil; rub with this until the gloss is restored, occasionally examining the progress of the work. This step being finished, wipe off with a perfectly clean cotton cloth, with a piece of the finest flax full of fine wheat flour or putty powder to go over the work, rubbing well to polish it still farther, and remove every particle of the oil and rotten-stone previously used. Finish off by rubbing the work briskly with an old silk handkerchief, which will induce a beautiful fine gloss. In every instance when a polish and varnish finish is required, do not omit to lay on an extra coat of varnish, as it will greatly enhance the appearance of the work.

Gilding and Ornamenting Carriages.—English gold size is the best for this purpose. If you cannot get it ready prepared, make a substitute by using English varnish and Japan in equal parts. If the gilding is for striping, you should mix a little chrome yellow with it, to be able to see the lines the better, but for lettering no coloring is required. Rub your job down smoothly, take a piece of muslin and tie up in it a little whitening to form a "pounce bag;" with this dust over every part of the work where the gold leaf is to be put, to prevent the leaf sticking to the surface not covered by the size, or wash the job over with starch water, or rub it over with the raw surface of a potato cut in halves; the juice of the potato soon dries, and leaves a thin film to which the gold will not adhere. Either of the above methods will do, and the coating will wash off when the gilding is dry. The surface prepared, take the size and put on the stripes, figures, or ornaments, and allow it to dry just enough to enable you to pass your finger over it without sticking, but if it is "tacky" when you place your finger upon it, it is ready for the gold leaf, which is to be applied in the way directed for gilding letters on wood. The gold letters may be shaded with ultramarine, carmine, asphaltum, lake, Paris green, verdigris, &c., to suit the taste.

Bronzing.—Gold bronze is used on carriage parts for striping and ornamenting, using the same size as that used for gold leaf. For taking up and applying the bronze, take a piece of plush or velvet and make a "pounce bag," by tying up a wad of cotton, rubbing the bronze gently over the size. To vary the appearance, a mixture of copper, gold, and silver bronze may be applied. For fancy work in bronze, cut out any desired pattern on thin sheet brass, pasteboard, or paper, and apply it to any nearly dry varnished surface; rub the bronze on through the apertures in the pattern.

Good Colors for Business Wagons.—No. 1. *Body.*—Chrome green; frame or ribs black, striped with white or cream color. *Running gear.*—Cream color striped with red, blue or dark green, or black, and red fine line. No. 2.

Body.—Yellow; frame black, striped with blue or white. *Running gear.*—Light vermilion, striped with black and white. No. 3. *Body.*—Carmine glaze over Indian red. *Running gear.*—Vermilion. No. 4. *Body.*—Deep vermilion. *Running gear.*—Light vermilion.

Priming for Carriage Work.—*First coat of lead.* Mix white lead with raw oil, 2 parts, Japan, 1 part, to make it proper for a thick coat, adding a very little turpentine to make it work easily. For carriage parts add a little Indian black, but not for bodies. *Second coat of lead.*—Mix white lead with 1 part raw oil and 2 parts Japan, and a little turpentine, as before, adding lampblack for carriage parts, but none for the body.—*Third and fourth coat.* Mix white lead into a thick paste with turpentine, add a little oil, Japan and rubbing varnish to bind the paint well; add, for the carriage parts, a little lampblack and a little red lead.

Hard Drying Putty.—*For carriage work.* Mix dry white lead with Japan and rubbing varnish, equal parts, to the proper consistency, beating it with a small mallet to bruise the lumps. Keep it, when not in use, in water, to prevent it drying.

Rough Stuff.—*For carriage work.* Take 3 parts of English filling (ground state), 2 parts dry white lead, 1 part white lead in oil. Mix with Japan, 2 parts; rubbing varnish, 1 part. Mix and crush thoroughly by running all through the mill together.

Facing Lead for Carriage Work.—Mix dry white lead with 2 parts Japan, 1 part rubbing varnish, and thin with spirits of turpentine, adding a little lampblack to make a clean lead color, and run all through the mill.

Coach Painting.—The panels of such work are generally painted in color, while the pillars, top strip, quarters, deck, &c., are always black; umber colors, lakes, greens, and blues, are some of the best colors used on this work. To prepare the body for any of these colors, a *ground* color is used in the place of lampblack on black work. The following are a few approved *grounds*. *Lake.*—Indian red and vermilion mixed to a dark brown, but some prefer a black ground for lake. *Ultramarine.*—Mix a medium blue with white lead and Prussian blue. *Vermilion.*—A light pink color is generally used as a ground for vermilion. *Green.*—Green and all heavy-bodied colors will cover well on the lead colors without any ground color. Victoria lake and black Japan makes a fine color for carriages.

Prepared Oil for Carriages, &c.—To 1 gal. linseed oil add 2 lbs. gum shellac; litharge, ½ lb.; red lead, ¼ lb.; umber, 1 oz. Boil slowly as usual until the gums are dissolved; grind your paints in this (any color), and reduce with turpentine.

Rules For Measuring Painter's Work.—In regard to measuring work, it is generally understood that the measurer's judgment must be exercised to a great extent. Hence, all work that may not come under any of these heads, must be left entirely to him.

The following rules are given as sort of landmarks, and are intended to aid the painter, not only in the measurement after the work is finished, but in making out bills and propositions for work, and they will also enable him to guess at the value of a job. The price, however, or the amount of deduction on this full bill, may be made according to the prices of material and wages; for at some seasons both wages and material, as also living, are much cheaper than others, consequently a per cent. on or off the bill may sometimes be necessary.

Prices per Square Yard.

Common Cheap Colors,—

First coat.	10 cents.
Second coat, ...	5 cents.
Third coat, ...	4 cents.
Fourth coat, ...	4 cents.

Blues, Chrome Yellow, Light Green,—

First coat,	14 cents.
Second coat,	10 cents.
Third coat,	7 cents.
Fourth coat,	7 cents.

Dark Green, Emerald, and other Costly Colors,—

First coat,	16 cents.
Second coat,	14 cents.
Third coat,	9 cents.
Fourth coat,	8 cents.

Sanding,—	8 cents.
One coat over the sand,	14 cents.
Second coat over the sand,	9 cents.
Oiling brick,	6 cents.
Pencilling brick,	12 cents.

Painting on Brick,—

First coat,	18 cents.
Second coat,	10 cents.
Third coat,	8 cents.
Fourth coat,	8 cents.

Other costly colors, per yard, extra, from 8 to 15 cents, according to the cost of the color and roughness of the work.

Graining, per square yard, for fair jobs, $1.00; varying, however, according to the amount and quality of labor, adding or deducting 50 cents.

Polishing, per square yard, 60 cents.

Puttying, for all work, add 5 per cent.

Sand-papering and cleaning, 5 per cent.

Girthing or Measuring.

Plain cornices, boxing, &c., girth once and a half, or one-half its measurement added.

Block and dentile, or other equivalent ornament, once, twice, or three times its measurement added, according to the difficulty of the labor.

All other ornament, difficult to paint or to get at, measure from once to five times its real girth.

Barge boards, water spouts, gutters, &c., measure three times.

Paling and railed gates, measure and a half, that is, three heights, besides girthing the rails and posts of the railing, if done with one color; but if the pales are topped with another color, 1 foot extra.

All stone facias, window and door arches, and sills, double.

Window and door frames, in and outside, double.

Venetian shutters, double the measure of plain work.

Post and railed fences to be girthed both post and rails, and one half more added to the girth.

Window bars shall be measured square. Window sash the same, if done with one color; but if done with two, they shall be double measure.

Corner strips on frame houses, if painted with a different color from the weather-boards, to girth double.

Rough weather-boarding and old roofs, double measure.

Oiling and pencilling on brick work shall be measured square, and on dead walls, from one-fifth to one-third added to the measurement.

Balusters (either inside or outside), to be measured three sides; if the hand rail is capped with a different color, one foot more to be added.

Corner strips, corner beads, and single architraves, double; double architraves, girth three times.

Pilasters, two or three times.

String boards to girth twice.

Wash boards, base boards, &c., double; capped with another color, six inches added.

Mouldings, measure twice or three times, according to work.

Base, or staircase, twice and a half.

Panels to be allowed two inches in height and breadth for each panel; but if the panels are done with one color and stiles of another, measure and half; if the mouldings are done with another color, double measure.

Edges of plain shelves, three inches girth; beaded or otherwise, from three to six inches girth.

Painting on plastering shall be measured square, and the openings deducted; making suitable allowance for cutting edges, and one-third added to the measurement.

Sizing the walls of plastering, three cents per square yard.

All beads or grooves too narrow to measure, one inch added for each.

All picked out work, to be valued according to trouble.

All work not herein expressed, to be measured according to the judgment of the measurer.

Rules for Measuring Brick Work.—All painting on brick shall be measured square, and the openings deducted, that is to say, the actual opening which the sash or door occupies, allowing the thickness of the door or window-frames to make up for the reveals; if the frames or reveals are of an uncommon thickness or depth, a proper allowance shall be made by the measurer. If the stone or brick caps or arches are or are not painted the same color as the wall, there shall be no change from the above rule; but if they are painted with a different color, they shall be called from one to two feet girth, the price to be according to color, and number of coats of that color. If the stone sills are done with a different or with the same color as the wall, they shall be called from one to two feet girth, according to color and number of coats. Stone or brick facias and water-tables, if done with the same color as the wall, they shall be measured in with it; but if painted with a different color, they shall be measured the same as stone sills, &c.

N. B. No reference is to be had to the above rules for measuring stone facias, &c., where the walls are not painted.

Prices for Glazing.

Prices for glazing new sash, and furnishing the putty,—

8 by 10, per light,	4 cents.
9 or 10 by 12, per light,	6¼ cents.
10 by 14 or 15, per light,	8 cents.
11 by 15, per light,	9 cents.
11 by 16, per light,	10 cents.
12 by 16 or 18, per light,	12½ cents.
14 by 20, per light,	16 cents.
16 by 22, per light,	20 cents.

When the glazier furnishes the glass, the usual retail prices shall be charged. If there is a percentage taken off the bill, the charge for the glass shall not be subject to it.

When the glass is bedded, the glazing shall be doubled. If back-puttied, price and a half.

Prices for glazing old sash, and furnishing the glass and putty,—

8 by 10, per light,	12½ cents.
9 or 10 by 12, per light,	18¾ cents.
10 by 14 or 16, per light,	25 cents.
11 by 15, per light,	31¼ cents.
11 by 16, per light,	37½ cents.
12 by 16 or 18, per light,	50 cents.
14 by 20, per light,	$1.00
16 by 22, per light,	$1.25

When the glass is furnished, the usual retail prices shall be deducted

from the above. If there is a per centage taken off the bill, the charge for the glass shall not be subject to it.

PRICES OF SIGN PAINTING.—Lettering is measured running measure, measuring the length of each line of letters, without regard to their heights.

Plain letters, per foot,	30 cents.
One shade, add	10 cents.
Double shade, add	20 cents.
Gold letters, per foot,	$1.00

Shading the same as other letters.

Other fancy and ornamental letters and shading, shading on the surface of the gold, add according to labor, being guided by the standard.

Japanned tin, in gold, running measure, per inch, 7 cents.

Shading, per inch, 2 cents.

Lettering on glass, running measure, per inch, 7 cents.

Colored letters on glass, tin, stone, or other columns, and all small boards, running measure, per inch, 3 cents.

Dashes and other plain ornaments, measured as letters.

Gold borders, per square inch, 3 cents.

In gilding plain surfaces, the labor is equal to the cost of the gold. Ornaments in proportion to the labor.

These rules will serve as a guide in proportioning the prices to the amount of labor. It would take a volume to adapt a full list of prices to meet every variety of lettering and ornamenting: and these prices may be considered as a standard, subject to being modified to suit the amount of cost and labor.

FRESCO PAINTING.—Steep good glue over night in water to soften, then melt in a suitable pot or kettle, applying the heat cautiously, so as not to boil, as boiling will render it unfit for use. Then take as much Paris whiting as you think you will use for your first coat, beat it up thick with water to a perfect pulp to get rid of lumps, &c. Now put in a pail as much of this whiting mixture as will be required for your work and proceed to mix in the colors required to produce the desired shade. The colors, previously ground in water, should be cautiously mixed with the hand, and the shade tested by drying a little on a shingle or white paper; if too dark, add more whiting, if too light, more color. Now add enough of your melted glue to bind or fix the color very hard so as not to rise or wash up with your second coat, and test this on paper or wood also, otherwise you may ruin your work. For *Yellow*, chrome yellow or different tints may be used. *Buff* or *Drab* can be got by a mixture of yellow ochre, red, blue, or black, and sometimes umber is intermixed with good effect. Buff or drab colors may be produced by yellow ochre, chrome yellow, or raw sienna, intermixed with Turkey umber. For *Green*, mineral or Paris green are first class. Any good chrome green will suit very well. For *Blue*, use cobalt ultramarine blue, Prussian blue and verditer. For *Grey*, use composition of white, blue, red and black. For *Red* use vermilion, Indian red, Venetian red, lake, carmine. For *Pink* or *Rose* tints, use a mixture of red with white, if not wanted bright, use Indian red, if a strong rich color is desired, use carmine, lake, Venetian red, or vermilion. For *Black*, use blue black and the Frankfort, or pure ivory black. For *Browns for shading, &c.*, use burnt sienna, burnt ochre, purple brown, colcother, burnt umber, Vandyke brown. For other tints, see COMPOUND COLORS. *French Size for Gilding Ornaments, Ceilings, &c.* Mix thick glue to the proper consistence, with a little pure honey, this imparts a beautiful color to the gold, and gives a splendid effect to the work. Previous to using the distemper colors, give the walls and ceilings, if new and clean, a good coat of paint, which should be mixed about ⅔ turpentine and ⅓ linseed oil, using as much Japan dryer as will dry it hard; be careful of adding too much oil, as it will spoil the subsequent work.

In preparing vestibules, halls, &c., to stand washing, go over the walls with oil paint for the first coat, but for the last coat no oil should be used, only spirits of turpentine. A harder surface will be given to the wall by

adding 1 tablespoonful of good pale copal varnish to each 25 lbs. of paint, used for the last coat. Previous to the wall receiving the last two coats, let the design or panelling be all correctly laid out.

To prepare old walls or ceilings; if there are any stains or cracks in the plaster, repair with size putty, if small, or use plaster of Paris and a little putty lime if the cracks are large, damping the places with a brush and water, then applying the plaster with a small trowel, afterwards smoothing off neatly. When all is dry and hard prepare the walls or ceilings with a coat of paint prepared as before directed, or with a preparation coat in size made of whiting with an extra quantity of melted glue containing a small quantity of alum. Give the walls a good coat of this, let it harden well, then apply another; this ought to be sufficient if good flowing coats are applied.

Now mix the colors to the proper tints (in oil), lay in the panels first; then the stiles, and when dry, put on the flat or last coat (spirit color). When the work is dry for panelling, use the following for mixing the finishing colors: Turpentine, a little mastic varnish, a little white wax, and a little pale damar. Varnish, use but little varnish, else too much gloss will be produced, the only use being to cause the color to set quickly to permit rapid work.

The fresco painter will find continued use for a book of designs to illustrate the different orders of architecture, pillars, columns, scrolls, borders, &c. and should make a particular study in the line of sketching anything and everything calculated to assist him in the business.

Paper-Hangings, Choice of.—The aspect, size, and general appearance of an apartment, is materially influenced by the paper on its walls; and the choice may be judiciously regulated by the following general rules: Avoid paper having a variety of colors, or a large showy figure, as no furniture can appear to advantage with such. Large figured paper diminishes the extent of a large room, and makes a small one appear smaller. Choose nothing that appears extravagant or unnatural. Have regard to the uses of an apartment; the drawing-room should be light and cheerful, the parlor warm and comfortable, without being gloomy or sombre; bed-rooms cool and quiet with neat small patterns. It is also worth while to consider the decorations of the wall; gilt frames show best on a dark ground, and dark frames, such as oak or gutta-percha, on a light ground. As regards color, pale tints will be generally found the best. Rooms hung with scarlet are rich but dismal and oppressive, they require also to be illuminated more, and at an earlier hour in the evening than lighter colors.

Paper-Hangings, to Clean.—Cut into eight half-quarters, a quartern loaf, two days old; it must not be either newer or staler. Blow off all the dust from the paper by means of a pair of bellows; take one of the pieces of bread, and holding the crust of the bread in the hand, wipe lightly downward with the crumb, about half a yard at each stroke, till the upper portion of the paper is completely cleaned all round. Then go round again, with the like sweeping stroke downwards; always commence each successive course a little higher than the upper stroke had extended, till the lower part be finished. This operation, if carefully performed, will make every old paper look almost equal to new. Great caution must be used not to rub the paper hard, nor to attempt cleansing it the cross or horizontal way. The soiled part of the bread must be each time cut away, and the pieces removed as soon as it may become necessary.

Tools for Paper Hanging.—The tools required are few and well known, but as some of them will be referred to, I will insert them here. Overalls (with bib, large pocket across, long and narrow pocket for rule and open slide for shears), long trimming shears and wet shears, straight edge, paste-board, plumb-bob, rule, paper brush, paste brush, paste pail, size kettle, step-ladder and roller.

Before commencing, have ready some pumicestone, sand paper, a basin of cold water, and two or three soft towels; I recommend the using of the large round brush for pasting, as it takes up the paste cleaner and more

readily, and can be turned in the hand easily; the paper brush I only use on soft, light paper, which cannot be handled much; on 40 inch tint, etc., always use the roller.

Paste for Paper Hanging.—It is well known that it is impossible to make good adhesive paste of any other than good sound wheat flour. It is perfectly useless to try any other. Much has been said of various substitutes, but I never heard of any success in their use.

Much more depends on the proper adaptation of the kinds of paste to the several purposes to which they have to be applied than is taken into general consideration.

Many who attempt paper hanging use one kind of paste for all purposes, without regard to circumstances; but as I am of the opinion that much depends on the application of suitable paste to certain walls and paper, I shall give those which I have found to answer best in cases where they have been applied.

No. 1 is the paste as generally used, and will answer for most papers; the quantity is sufficient for a day's work. Beat up 4 lbs. of good white wheat flour in cold water—enough to form a stiff batter (sifting the flour first); beat it well, to take out all lumps; then add enough cold water to make it the consistence of pudding batter; add about two ounces of well pounded alum. Be sure and have plenty of boiling water ready; take it quite boiling from the fire, and pour gently and quickly over the batter, stirring rapidly at the same time: and when it is observed to swell and lose the white color of the flour, it is cooked and ready.

This will make about three-quarters of a pail of solid paste; do not use it while hot; allow it to cool and it will go further; you may put about a pint of cold water over the top of it, to prevent it skinning; before using, thin this with cold water to spread easily and quickly under the brush. This paste will keep a long while without fermentation, when it is useless; mould on the top does not hurt it; remove it, the remainder is good.

No. 2. This paste is made the same as No. 1, with the exception that no particle of alum is used.

No. 3. This paste is seldom wanted, except where great adhesiveness is required. In a kettle or iron pan of suitable size, mix flour with cold water in the same manner as in No. 1; make the batter of much less consistence, and to two quarts of batter add half an ounce of pounded resin. As the resin does not dissolve so readily, set the pan containing the ingredients over a moderate fire, constantly stirring until it boils and thickens, and a short time after put out to cool.

As some adhesive liquid is required to reduce its consistence, I would recommend a thin gum arabic water as the best. This paste is indispensable in papering over varnished paper or painted walls.

No. 4. This paste is made in the same way as No. 3, without the alum.

Sizing for Walls.—Walls that have been whitewashed or colored require sizing or scraping. It is hardly necessary for me to explain that size is simply glue and water; for ordinary purposes the common black glue is sufficient; for sizing paper preparatory to varnishing, the best German white glue is necessary. In making size, take your glue and soak over night in cold water, and then add hot water until dissolved.

Preparation of Walls or Grounds.—It is highly essential to the attainment of neatness and perfection in paper hanging, that the walls or grounds should be in a proper state to receive it; there are few things either in art or science that do not require a sound and clear foundation, and the preparation for paper hanging is no exception to that rule.

In White or Colored Walls in Distemper.—As I said before, those walls that are white-washed or colored require a very careful preparation. Some rooms have been white-washed so often that one coat on another has amounted to the thickness of a coat of plaster. All this must be removed by damping and scraping. Care must be used to indent the walls as little as possible, as the blemishes will not be hidden by the paper.

Observe particularly that the top, bottom, and angles are well scraped; after filling all inequalities with plaster of Paris, wash over the wall with hot size, and they are ready.

Plaster of Paris is a very useful article for the paper hanger, merely mixing it with water, and applying it to all holes. It is the best thing I ever used, as it does not contract in drying.

On the Preparation of Grounds Affected with Damp.—Damp is one of the worst things with which a paper hanger has to contend, and a great many means are resorted to for overcoming it. The following are among the best:

No. 1. Wall metal; No. 2. Battening for lath and plaster; No. 3. Battening and canvassing; No. 4. Strong brown paper; No. 5. Ivy on outside walls. Of these, the surest plan is battening for lath and plaster; but as it is attended with much trouble and expense, it is seldom used. This is a plasterer's work, and as it is well known, it is useless to describe it.

Battening and canvassing is a very good method. The wooden plugs or battens must be made of good hard wood, and driven well into the wall; they must be placed close to the top, bottom, windows, and fire-place; and double, to form a right angle at each of the corners; then cut, and have your canvass backstitched in sizes that each piece may cover a side or end; stretch and tack on the battens with tinned tacks; use very stiff paste over canvas work.

Wall metal, or sheet lead, is very good. It can be used to good advantage on parts of walls, as some lower sides next an alley, etc. As it is made now, it can be evenly pressed on the wall with strong paste, No. 1.

Strong brown paper is next best for damp walls. It is made at the mills of immense size. When using, cut off the rough edges, and wet it well with water; let it stand until soft and pliable; as it is mostly in demand for parts of walls partly damp, or to level the unevenness of walls, it should be put on with tinned tacks, as others rust and show through fine papers.

Ivy on Outside Walls.—This preventative of damp is not in a paper hanger's line; but as I have had some experience in it, I give it. I found that on walls that are affected with damp, if ivy or some close leaved plant is grown so that its close overhanging leaves prevent the rain and moisture from permeating the wall, in a little time it will leave the wall inside dry.

On Hanging Common Papers.—Having given the remedies for the various obstacles which present themselves, I will give a few plain directions to hang paper after the wall is properly prepared and the tools in order. Trim the paper close to the pattern on one side and within one-eighth of an inch on the other for a lap, measure the number of breadths required, and cut from your pieces, leaving remnants for over doors and windows; then commence hanging; try and begin at a bead or where it will not show when you stop; the bead down the left side of a mantel is the best place; work all papers to the left, and in hanging they will always be on your right, and can be easily cut and fitted in the angles as you proceed; try and make the lapping joint face the light, so that it may not be seen; many striped and formal patterns require uniformity; always make them centre over the mantel and between piers. My method to do this is to cut a slip of paper of the size of the mantel, and try it across the paper until you strike that part of the pattern that will come the same on both sides, then cut off each breadth on each side enough to make the part measured come on each side.

On Pasting Paper.—Lay your breadths carefully on your table, and bring the first piece just to the edge; have your paste pail and brush at your right hand and take a brush full of paste and begin from left to right, double over the paper and pass to the left and finish and double the balance; you should observe to fold the longest part to commence with at the right top, for the obvious reason of having your breadth plumb, and matching the pattern. With borders it is well to paste double and cut after pasting; it is the fastest way.

Lining Paper.—Lining paper is in most cases to be recommended as a ground for delicate paper hangings. It adds much to a soft effect, also making an evenness to a wall, a quicker absorption of the paste, the want of which is frequently injurious to stained grounds. It is to be had at the mills in large rolls cut off in breadths the same as the paper. Hang without lapping.

Hanging Flock Papers with Crimson Stained Ground.—I believe that this kind requires more care and attention than any other, therefore I hope my method will be acceptable. These papers are subject to discoloration even by trifling mismanagement. Pastes Nos. 2 and 4 must be used; have them in separate vessels, with a brush to each; as great adhesiveness is only required on the lap edge, paste it with No. 4, the rest of breadth with No. 2. The advantage of this system will be obvious to a paper hanger; he will know that this paper does not require a quantity of strong paste. All joints must be cut with a sharp knife; the edge must butt as in forty-inch tints; be careful to take off with your knife all the little pips or marks of flock projecting beyond the pattern. Gold moulding is the only suitable border.

Panelling.—For effect in panel work, much depends on taste, and often the workman is directed by the owner or employer, but he should know how to produce certain effects. Where the fireplace, doors and windows, are situated about uniformly in a room, there is no difficulty to decide; make your styles and vails in a regular size, according to the height of the room; to a ten feet room, say about six inch vails, &c.; to a room to be done in wood, make rosewood style and light oak centres with suitable mouldings, and reverse according to taste. Another mode of panelling is to make each side in one panel where the doors and windows are not alike; this is an excellent plan. In all apartments of a panelled room there should be a full panel, and the greatest nicety should be observed in centreing the pattern in the panel, for where pictures are to be placed in them, the least deviation from uniformity will be seen, and it is displeasing to any critical eye. As before stated, be careful to have the laps toward the light.

Wood Hangings, Forty-Inch Tints, Stamped Gold, &c.—Of wood hangings I would not recommend a general use; they will not answer on a whole room, but I have found that some woods, the soft maples, cedar, birch, &c., make very pretty and durable work. My secret for applying them is as follows: Have your wood cut to right size, and then with a soft sponge apply glycerine, let it stand over night, and the woods will be as pliable as paper; then apply to the walls with paste No. 3, rub down with wooden scraper. On forty-inch tints and wood papers I would always have two workmen pasting with paste No. 2. I have found these papers to stain when one is pasting, on account of not being able to apply the paste evenly. The same remarks apply to stamped gold, &c. One of the best plans I have found to trim plain tints and stamped gold is that, having no pattern to cut, to drive an awl through the piece and trim by the small holes made; drive the awl within an eighth of an inch of the end of the piece. Always apply these papers with paper hangers' rollers made of wood with cloth covering. I find it a good plan when butting the edge of plain tints to roll the edges with a bed castor, which will effectually prevent any seams from being seen.

Cautions to Paper Hangers—Poisonous Paper, &c.—It is needless, I think, to caution any good workman against using paste and refuse to fill holes in plastering, preparatory to papering. This has caused severe illness to occupants of the room. The common plan of papering over old paper, in some cases many layers, is bad, as mould is apt to result. Formerly all green papers were objectionable on account of the arsenic. Now aniline has taken its place in some of the green papers, but flock or velvet papers are injurious not only on account of the color being poisonous in some cases, but also owing to the dust which comes off into the air.

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MARBLE AND IVORY WORKERS.

How to Cut, Polish and remove Stains from Marble, to Soften, Silver, and Dye Ivory, &c.

To Cut and Polish Marble.—The marble saw is a thin plate of soft iron, continually supplied, during its sawing motion, with water and the sharpest sand. The sawing of moderate pieces is performed by hand; that of large slabs is most economically done by a proper mill. The first substance used in the polishing process is the sharpest sand, which must be worked with till the surface becomes perfectly flat. Then a second and even a third sand, of increasing fineness, is to be applied. The next substance is emery, of progressive degrees of fineness; after which tripoli is employed; and the last polish is given with thin putty. The body with which the sand is rubbed upon the marble is usually a plate of iron; but, for the subsequent process, a plate of lead is used, with fine sand and emery. The polishing rubbers are coarse linen cloths, or bagging, wedged tight into an iron planing tool. In every step of the operation, a constant trickling supply of water is required.

Powerful Cement for Broken Marble.—Take gum arabic, 1 lb.; make into a thick mucilage; add to it powdered plaster of Paris, 1½ lb.; sifted quick lime, 5 ozs.; mix well; heat the marble and apply the mixture.

Seven Colors for Staining Marble.—It is necessary to heat the marble hot, but not so hot as to injure it, the proper heat being that at which the colors nearly boil. *Blue;* alkaline indigo dye, or turnsole with alkali. *Red;* Dragon's blood in spirits of wine. *Yellow;* gamboge in spirits of wine. *Gold Color;* sal-ammonia, sulphate of zinc, and verdigris, equal parts. *Green;* sap green in spirits of potash. *Brown;* tincture of logwood. *Crimson;* alkanet root in turpentine. Marble may be veined according to taste. To stain marble *well* is a difficult operation.

Perpetual Ink for Tombstones.—Pitch, 11 lbs.; lampblack, 1 lb.; turpentine sufficient; mix with heat.

To Clean Old Marble.—Take a bullock's gall, 1 gill soap lees, half a gill of turpentine; make into a paste with pipeclay, apply it to the marble; let it dry a day or two, and then rub it off, and it will appear equal to new; if very dirty, repeat the application.

To Extract Oil from Marble or Stone.—Soft soap, 1 part; fullers earth, 2 parts; potash, 1 part; boiling water to mix. Lay it on the spots of grease, and let it remain for a few hours.

To Gild Letters on Marble.—Apply first a coating of size and then several successive coats of size thickened with finely powdered whiting until a good face is produced. Let each coat become dry, and rub it down with fine glass paper before applying the next. Then go over it thinly and evenly with gold size and apply the gold leaf, burnishing with an agate; several coats of leaf will be required to give a good effect.

To Clean Marble.—Take two parts of common soda, 1 part pumice-stone, and 1 part of finely powdered chalk; sift it through a fine sieve, and mix it with water; then rub it well all over the marble, and the stains will be removed; then wash the marble over with soap and water, and it will be as clean as it was at first.

Marble, to Clean.—Mix a quarter of a pound of soft soap with the same quantity of pounded whiting, an ounce of soda, and a piece of stone-blue the size of a walnut; boil these together for a quarter of an hour; whilst hot, rub it over the marble with a piece of flannel, and leave it on for twenty-four hours; then wash it off with clean water, and polish the marble with a piece of coarse flannel. *To remove spots and grease from marble:* —Make a paste with fuller's earth and hot water; cover the spots with it, and let it dry on; and the next day scour it off with soft or yellow soap

Marble, to Imitate.—Dissolve an ounce of curd soap, grated in four ounces of water, in a glazed earthen vessel; add an ounce of white wax cut in thin slices; when the whole is incorporated, it is fit for use. Having dried the figure before the fire, suspend it by a string, and dip it in the mixture; when it has absorbed the varnish, dip it a second time, and that generally suffices. Cover it carefully from the dust for a week, then rub it gently with soft cotton wool, and a brilliant shining gloss will be produced exactly resembling polished marble.

To take Stains out of Marble.—Mix unslacked lime, in finest powder, with the strongest soap-lye pretty thick; and instantly, with a painter's brush, lay it on the whole of the marble. In two months' time wash it off perfectly clean; then have ready a fine thick lather of soft soap boiled in soft water; dip a brush in it, and scour the marble, not as common cleaning. This will, by very good rubbing, give a beautiful polish Clear off the soap, and finish with a smooth hard brush till the end be effected.

To take Iron-stains out of Marble.—An equal quantity of fresh spirit of vitriol and lemon-juice being mixed in a bottle shake it well; wet the spots, and in a few minutes rub with soft linen till they disappear.

Alabaster.—A species of soft marble used for ornamental purposes, which derives its name from Alabastron, a town of Egypt, where a manufactory formerly existed of works of art in domestic vessels, executed from the stone found in the neighboring mountains. As this composition is of a delicate nature, easily scratched, and soon stained by the smoke or atmosphere, all objects should be preserved from these external influences by being kept under glass shades. Should they, however, become stained, the following is the best method *To cleanse Alabaster:*—Remove the stains by brushing with soap and water, then whitewash the stained part, and let it remain for some hours; after which remove the whitewash, rub the stained part with a soft cloth, and the stains will have disappeared. *Grease spots* may be removed by rubbing the blemishes with powdered French chalk, or a little oil of turpentine.

To Bronze.—Apply to the whole surface of the object a coat of size, after which lay on paint of a bronze-green color; and when this is nearly dry, gently apply to the most prominent parts a little bronze-powder through the medium of a wad of wool or soft cotton. The success of the process greatly depends upon the delicacy with which it is conducted.—See Bronze and Size.

To Imitate.—Alabaster ornaments may be imitated by brushing over plaster of Paris models with spermaceti, white wax, or a mixture of the two, or by steeping the models in the warm mixture. Or, instead of this process, they may be brushed over several times with white of egg, allowing

each coating sufficient time to dry. Only models made of the finest plaster are suited for these processes.

To Join.—As alabaster objects are composed of several parts, they are liable, from a variety of causes to become disjointed, and when this occurs the parts may be rejoined by a cement made from the white of one egg mixed with a teaspoonful of quick lime. The cement should be used immediately that it is mixed, and the parts to be joined should be previously damped with lukewarm water.

To Clean Alabaster, or any other Kinds of Marble.—Pound pumice stone to a fine powder, and mix it with verjuice. Let it remain several hours, then dip in a perfectly clean sponge, and rub the marble with it till clean. Rinse it off with clear fresh water, and rub it dry with a clean linen cloth.

Ivory.—A substance which is properly obtained from the tusks of the elephant, the teeth of the hippopotamus, wild boar, &c. It is largely used for the handles of knives, and for other purposes requiring a smooth and clean white surface. Carvings in ivory when not kept under glass, sometimes become covered in time with a multitude of minute cracks which get filled with dirt and deface them. Glass not only protects them from this injury, but affords the means of bleaching or whitening ivory which has been discolored. This effect is produced by exposing the articles to the sun's rays under glass, turning each side in succession to the direction of the rays. To remove the cracks before mentioned, the ivory should be washed in soap and warm water with a brush till the cracks disappear, after which the article should be placed under glass.

Ivory, to Stain.—Ivory may be stained of any color, after being freed from dirt and grease, as follows :—*Black.* Wash the ivory well in an alkaline lye, steep it in a weak solution of nitrate of silver, then expose it to the light. *Blue.* Steep it in a weak solution of sulphate of indigo which has been nearly neutralized with salt of tartar. *Brown.* As for black, but using a weaker solution of silver. *Green.* Dissolve verdigris in vinegar, and steep the pieces therein for a short time, observing to use a glass or stoneware vessel. *Purple.* Steep it in a weak neutral solution of terchloride of gold, and then expose it to the light. *Red.* Make an infusion of cochineal in water of ammonia, then immerse the pieces therein, having previously soaked them for a few minutes in water very slightly acidulated with aqua-fortis. *Yellow.* Steep the pieces for some hours in a solution of sugar of lead, then take them out, and when dry, immerse them in a solution of chromate of potassa.

To Polish Ivory.—Remove any scratches or file marks that may be present with finely pulverized pumice stone, moistened with water. Then wash the ivory, and polish with prepared chalk, applied moist upon a piece of chamois leather, rubbing quickly.

Etching Fluid for Ivory.—Take dilute sulphuric acid, dilute muriatic acid, equal parts ; mix. For etching varnish take white wax, 2 parts ; tears of mastic, 2 parts ; mix.

To Gild Ivory.—Immerse it in a solution of nitro-muriate of gold, and then expose it to hydrogen gas while damp. Wash it afterwards in clean water.

To Silver Ivory.—Pound a small piece of nitrate of silver in a mortar, add soft water to it, mix them well together, and keep in vial for use. When you wish to silver any article, immerse it in this solution, let it remain till it turns of a deep yellow ; then place it in clear water, and expose it to the rays of the sun. If you wish to depicture a figure, name, or cipher, on your ivory, dip a camel's-hair pencil in the solution, and draw the subject on the ivory. After it has turned a deep yellow, wash it well with water, and place it in the sunshine, occasionally wetting it with pure water. In a short time it will turn of a deep black color, which, if well rubbed, will change to a brilliant silver.

To Soften Ivory.—In 3 oz. spirits of nitre and 15 oz. of spring-water,

mixed together, put your ivory to soak; and in three or four days it will obey your fingers.

To Whiten Ivory.—Slake some lime in water; put your ivory in the water, after being decanted from the grounds, and boil it till it looks quite white. To polish it afterwards, set it in the turner's wheel; and, after having worked, take rushes and pumice-stones, subtile powder, with water, rub it till it looks perfectly smooth. Next to that, heat it by turning it against a piece of linen or sheep-skin leather: and when hot, rub it over with a little dry whiting diluted in oil of olives; then with a little dry whiting alone: finally with a piece of soft white rag. When all this is performed as directed, the ivory will look very white.

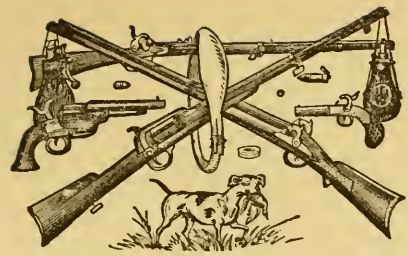
Another way to Bleach Ivory.—Take 2 handfuls of lime, slake it by sprinkling it with water: then add 3 pts. of water, and stir the whole together; let it settle ten minutes, and pour the water into a pan for your purpose. Then take your ivory and steep it in the lime-water for 24 hours, after which, boil it in a strong alum-water 1 hour, and dry it in the air.

Dyes for Ivory, Horn, and Bone.—*Black.*—1. Lay the articles for several hours in a strong solution of nitrate of silver, and expose to the light. 2. Boil the article for sometime in a strained decoction of logwood, and then steep in a solution of per-sulphate or acetate of iron. 3. Immerse frequently in ink until of sufficient depth of color. *Blue.*—1. Immerse for some time in a diluted solution of sulphate of indigo, partly saturated with potash, and it will be fully stained. 2. Steep in a strong solution of sulphate of copper. *Green.*—1. Dip blue-stained articles for a short time in a nitro-hydrochlorate of tin, and then in a hot decoction of fustic. 2. Boil in a solution of verdigris in vinegar until the desired color is obtained. *Red.*—1. Dip the article first in a tin mordant used in dyeing, and then plunge in a hot decoction of Brazil wood—½ lb. to a gallon of water—or cochineal. 2. Steep in red ink till sufficiently stained. *Scarlet.*—Use lac dye instead of the preceding. *Violet.*—Dip in the tin mordant, and then immerse in a decoction of logwood. *Yellow.*—Boil the articles in a solution of alum, 1 lb. to ¼ a gallon, then immerse for half an hour in the following mixture: Take ½ lb. of turmeric, and ¼ lb. pearlash; boil 1 gal. water: when taken from this, the bone must be again dipped in the alum solution.

Mother of Pearl Work.—This delicate substance requires great care in its workmanship, but it may be cut with the aid of saws, files and drills, with the aid of muriatic or sulphuric acid, and it is polished by colcothar, or the brown red oxide of iron left after the distillation of the acid from sulphate of iron. In all ornamental work, where pearl is said to be used, for flat surfaces, such as inlaying, mosaic work, &c., it is not real pearl, but mother of pearl that is used.

To Polish Pearl.—Take finely pulverized rotten stone and make into a thick paste by adding olive oil; then add sulphuric acid a sufficient quantity to make into a thin paste, apply on a velvet cork; rub quickly, and as soon as the pearl takes the polish, wash it.

Horn in Imitation of Tortoise-Shell.—First steam and then press the horn into proper shapes, and afterwards lay the following mixture on with a small brush, in imitation of the mottle of tortoise-shell: Take equal parts of quick lime and litharge, and mix with strong soap-lees; let this remain until it is thoroughly dry; brush off, and repeat two or three times if necessary. Such parts as are required to be of a reddish brown should be covered with a mixture of whiting and the stain.



GUNSMITHS, TINSMITHS, &c.

The Manufacture, Care and Management of Guns, Sizes of Tinware, Lacquer for Tin, &c.

GUN, Care and Management of.—Every gun, if only moderately used, requires occasionally to be taken entirely to pieces. Twice a year the breech or breeches of a gun which is much used should be taken out; the pivots and locks will require more frequent attention. The following instructions relative to the care and management of the gun will be found useful. *On taking off the mainspring*, first put the lock on full cock; next cramp the mainspring, then let down the cock, and the mainspring will fall off. When the cock is to be put on again, first let the cock be left down; then hook the end of the mainspring on the swivel or chain; then move it up and place it into its position on the lock-plate; this done, unscrew the cramp, and the lock is once more fit for action. When the hammer is to be taken off, first shut down the hammer carefully, cramp the spring, until by shaking the lock the hammer is heard to rattle; then take out the screw behind, and the hammer will fall off. To put it on again, replace it in its former situation; turn in the screw, and set the spring free. If the hammer-spring is to be taken out, the hammer and mainspring must be released, in order to reach the screw behind; the hammer spring must then be cramped, till it is taken out and put on again to receive the hammer. *In taking to pieces the small works of a gun-lock*, be careful to keep the screws distinct. Commence by taking off the mainspring, next unscrew and take out the scear, by half-cocking the lock; clasp the forepart of the lock, firmly pressing the thumb at the same time against the hinder part of the cock, directing it forward, while the scear and scear-spring, being now pressed together with the forefinger and thumb, will facilitate the taking out of the scear-screw. Then undo the two screws, take off the bridle, unscrew and take out the scear-spring; next unscrew and take off the cock, which will readily separate from the tumbler if it be gently tapped or shaken; this done, take out the tumbler, and the process is finished. *When it is required to put the lock together again.* First put the tumbler in its place and screw on the cock; next do the same by the scear spring; set on the bridle with the two upper screws, put in the scear, let down the cock, to admit of putting on the mainspring, and the operation is complete. The locks do not require to be taken off every time a gun is used; once a fortnight is quite sufficient. Put a little fine oil to the parts where there is friction; but if the gun has been used on a wet day, the lock should be taken off, cleaned, and oiled immediately. *Gun cleaning* is practised in a variety of ways, but the following directions will probably be found as good as any; place the breech end

of the barrels in a bucket, in which there is cold water about three inches deep; then, after wetting the sponge, cloth, or tow, introduce the rod into the barrels, and work it well; next apply the wire brush attached to the cleaning rod with some clean hot water, which will take out all the lead. Wipe the rod and the outside of the barrels dry, and set the latter upright, muzzle downwards, for two minutes to drain, after which rub them perfectly dry. Wipe the barrels out clean, then pass an oiled rag down the inside, and rub over the outside, leave them a little oily, which will prevent rust. The frequency with which a gun should be cleaned depends upon circumstances. Some guns foul sooner than others. Some powder also fouls more than others; and as a rule small shot fouls a gun sooner than large shot. Under all circumstances, a gun should be wiped out after every twenty shots; its more effective use after the operation amply compensating for the trouble. *When a gun is put by for the season*, care should be taken to place it where no damp can come to it; the best preventative for this evil, is to have iron rods made of the length and diameter of the barrel, leaving just sufficient room to cover the rod with kerseymere, or some other woollen material; the rod thus furnished should be placed within the barrel; in addition to this, a little wax should be placed over the touch-hole, and no damp can then possibly penetrate. Never put a gun by for the season without having taken the breech out. Remove, clean, and thoroughly dry the screws, lubricate the threads with pure tallow and return them. *To remove rust from the inside of the barrel*, adopt the following method: Have an ashen rod turned a few inches longer than the barrel, and nearly the size of the bore. Let one end of the rod be cut lengthwise, so as to make a slit of six inches long; into which insert as much fine emery paper as will completely fill up the bore of the barrel, taking care in folding the paper tightly round the wood, that the emery surface is outward. Force it into the barrel by screwing it downwards from the top to the bottom; repeat this process until the barrels show a perfectly clean and polished surface. Sand and other coarse materials should never be used for this purpose, as they abrade the surface of the barrel, and consequently injure it.

GUNS, Precautions respecting.—In putting away a gun, the greatest care is necessary in order to prevent accidents; as a rule it is always better to fire the gun off previously to entering the house; but as this is sometimes to be objected to, owing to the disturbance and alarm which it occasions, the following precaution should at any rate be observed. Having arrived at your door, remove the cap of the gun, if a percussion piece, or if a flint throw out the priming, let down the spring of the lock, draw the ramrod, and dropping it down the barrel, put the gun away into a closet or other safe place of your own, or suspend it in your study high above the reach of any one, and all must be safe at least against ordinary risks.

To Remedy Scattering Shot Guns.—The only remedy known to gun smiths is by choke-boring, that is, boring from the breech of the gun, so as to have a gradual taper towards the muzzle. This method of boring greatly improves the shooting qualities of the gun, as the charge concentrates at the muzzle. Large shots are more apt to scatter than fine, but this depends on the bore of the gun. A large bored gun does not shoot fine shot so well as medium. A small bored gun throws fine shot with greater force than a large bored one. As a general thing, a small bored gun is not adapted to large shot, as it does not chamber them well. The length of gun also depends on the size of the bore—28 or 30 inches for a gun of from 10 to 14 gauge; 30 to 34, of guns from 8 to 10; 26 to 28, of guns of 15 to 18 gauge.

Bronzing Fluid for Guns.—Nitric acid, sp. gr. 1., 2 parts; nitric ether, alcohol, muriate of iron, each 1 part; mix, then add sulphate of copper, 2 parts, dissolved in water, 10 parts.

Blueing on Revolvers and Gun Barrels.—Is performed by simply heating the piece to be blued in powdered charcoal over a fire until the desired color is obtained.

Fine Blue Finish for Gun Barrels.—Apply nitric acid and let it eat into the iron a little; then the latter will be covered with a thin film of oxide. Clean the barrel, oil and burnish. A very fine appearance is given to gun barrels by treating them with dilute nitric acid and vinegar, to which has been added sulphate of copper. The metallic copper is deposited irregularly over the iron surface; wash, oil, and rub with a hard brush.

Browning for Gun Barrels.—Spirits of nitre, 1 lb.; alcohol, 1 lb.; corrosive sublimate, 1 oz.; mix in a bottle, and cork for use. Directions: polish the barrel perfect; then rub it with quick lime with a cloth, which removes grease and dirt; now apply the browning fluid with a clean white cloth, apply one coat, and set it in a warm dark place for from 10 to 20 hours, until a red rust forms on it; then card it down with a gunmaker's card, and rub off with a clean cloth. Repeat the process if you wish a dark shade.

Browning for Twist Barrels.—Spirits of nitre, ¾ oz.; tincture of steel, ¾ oz.; or use the unmedicated tincture of iron if the tincture of steel cannot be obtained; black brimstone, ¼ oz.; blue vitriol, ½ oz.; corrosive sublimate, ¼ oz.; nitric acid, 1 dram; copperas, ¼ oz.; mix with 1½ pints rain water, and bottle for use. This is to be applied the same as the first; it causes the twist of the barrel to be visible after application, a quality which the other liquid does not possess.

Browning Composition for Gun Barrels.—1. Blue vitriol, 4 ozs.; tincture of muriate of iron, 2 ozs.; water, 1 qt.; dissolve, and add aquafortis and sweet spirits of nitre, of each, 1 oz. 2. Blue vitriol and sweet spirits of nitre, of each, 1 oz.; aquafortis, ½ oz.; water, 1 pint. To be used in the same manner as previously described in this work.

Varnish and Polish for Gun Stocks.—Gum shellac, 10 ozs.; gum sandarac, 1 oz.; Venice turpentine, 1 dr.; 98 per cent. alcohol, 1 gal.; shake the jug occasionally for a day or two, and it is ready for use. Apply a few coats of this to your gun stocks, polish by rubbing smooth, and your work is complete.

Boring Gun Barrels.—Take a piece of rod, cast steel, ⅛ inch smaller than the interior of the barrel, and a few inches longer, beat one end up something larger than the size of the bore, then turn or file it in the shape of an egg, leaving the swell, or centreing part 1-20th of an inch larger than the bore. With a saw file, cut longitudinal cuts, ⅛ inch apart, laying them the same angle as a rose bit countersink, taking care not to injure the periphery of the tools; harden and temper to straw color.

Damascus Twist and Stub-Twist Gun-Barrels.—The twisted barrels are made out of long ribands of iron, wound spirally around a mandril, and welded on their edges by jumping them on the ground, or rather on an anvil embedded therein. The plain stub barrels are made in this manner, from iron manufactured from a bundle of stub-nails, welded together, and drawn out into ribands, to insure the possession of a material most thoroughly and intimately worked. The Damascus barrels are made from a mixture of stub-nails and clippings of steel in given proportions, puddled together, made into a bloom, and subsequently passed through all the stages of the manufacture of iron, in order to obtain an iron that shall be of an unequal quality and hardness, and therefore display different colors and markings when oxidized or browned. Other twisted barrels are made in the like manner, except that the bars to form the ribands are twisted whilst red hot, like ropes, some to the right, others to the left, and which are sometimes laminated together for greater diversity. They are subsequently again drawn into the ribands and wound upon the mandril, and frequently two or three differently prepared pieces are placed side by side to form the complex and ornamental figures for the barrels of fowling-pieces, described as *stub-twist*, *wire-twist*, *Damascus-twist*, &c. Sometimes Damascus gun-barrels are formed by arranging twenty-five thin bars of iron and mild steel in alternate layers, welding the whole together, drawing it down small, twisting it like a rope, and again welding three such ropes, for the formation of

the riband, which is then spirally twisted to form a barrel, that exhibits, when finished and acted upon by acids, a diversified, laminated appearance, resembling, when properly managed, an ostrich feather.

Damaskeening.—This is the art, now in a great measure lost, of producing a watered or wavy appearance on steel sword-blades, armor, &c., or of inlaying and encrusting steel with gold and silver, originally practised at Damascus. Various methods of damaskeening were practiced, but the most common seem to have been those of welding two different kinds of steel, or steel and iron, together, or of cutting lines on the surface of the steel and filling them with gold or silver, which was either forced into the incised lines and brought to a level with the surface of the steel, or remained in relief above it. When the former method was used, a light pattern, generally in many lines, was produced on a dark ground, or *vice versa*, and the junction of the metals caused the pattern to run through the entire thickness of the blade, so that it could not be obliterated even by grinding.

GUNPOWDER.—A substance composed of three ingredients, saltpetre, charcoal, and sulphur. The quality of gunpowder is best estimated by actual trial of its power and cleanliness in use. It should be dry, hard, and free from dust; the grains should be of a uniform size, and glossy, and the color a dark grey, or brownish grey, not perfectly black. A very little placed on a piece of paper and fired, should instantly explode with a flash, and neither leave a perceptible residue on the paper, nor burn it. Dried by the heat of boiling water it should not lose more than ½ to 1% of its weight. From the aptitude which gunpowder has for absorbing moisture, it is extremely difficult to make it retain its original strength without extreme care. Gunpowder used in this deteriorated state, has also a tendency to foul the gun barrels. On all occasions, therefore, where gunpowder has been exposed to the air, it should be dried previously to being used, and especially so when the atmosphere is known to be superabundantly charged with moisture. Gunpowder should be bought in canisters only, and as fresh as possible. In keeping it, it should be guarded as carefully as possible from exposure to the air. The common tin case, however closely prepared, is not sufficient for the purpose, unless it be rendered waterproof, and closed either by a soft velvet cork, or a fine threaded screw; the former is preferable. An excellent plan is to divide large quantities into smaller ones, and put them into bottles, each containing about four ounces; which being corked and sealed prevents exposing more than is wanted for immediate consumption. Sportsmen and others should take care to purchase their gunpowder from such sources as will secure its genuineness; if possible, from the maker direct, but at any rate through a channel having a direct communication with the powder mill. The method resorted to by powder merchants for restoring damaged gunpowder is, to put part of the gunpowder on a sail-cloth, and add to it an equal weight of good powder; the two are then mingled together, then dried in the sun, barrelled up, and set by in a dry place. When it is found to be very bad, it is restored by moistening it with vinegar or brandy; then beat fine and sifted; and to every pound of powder is added an ounce, or an ounce and a half, or two ounces (according to its stage of decay) of melted nitre. These ingredients are afterwards well moistened, thoroughly mixed, and granulated in the ordinary way.

Blasting Powders.—Reduce *separately* to powder, 2 parts chlorate of potassa and 1 part red sulphuret of arsenic; mix very lightly together, or powder separately, 5 parts chlorate of potassa; 2 parts red sulphuret of arsenic, and 1 part ferrocyanide of potassium (prussiate of potassa); mix carefully, or, mix carefully as before, after having separately reduced to powder equal parts chlorate of potassa and ferrocyanide potassium. These possess eight times the explosive force of gunpowder and must be used with the greatest caution.

Blasting Rocks, &c.—In small blasts, 1 lb. of powder will loosen about 4½ tons. In large blasts, 1 lb. of powder will loosen about 2½ tons; 50 or 60 lbs. of powder, enclosed in a resisting bag hung or propped up against a

gate or barrier, will demolish any ordinary construction. One man can bore, with a bitt 1 inch in diameter, from 50 to 60 inches per day of 10 hours in granite, or 300 to 400 ins. per day in limestone. Two strikers and a holder can bore with a bitt 2 ins. in diameter 10 feet per day in rock of medium hardness.

To Make Dualin.—Dualin is made from paper stock, saturated with nitrate of potassium and dried in a furnace, then ground and mixed with nitro-glycerine. *Component parts of nitro-glycerine.* To 4¾ lbs. concentrated sulphuric-acid and 2⅓ lbs. of concentrated nitric acid, add 1 lb. of glycerine.

To Clean Cotton Waste.—Pack the waste in a tin cylinder with a perforated false bottom and tube with stop-cock at bottom. Pour on the waste bisulphide of carbon sufficient to cover, and allow to soak a few minutes, then add more bisulphide, and so on for a time or two, and then squeeze out. By simple distillation the whole of the bisulphide, or nearly all, can easily be recovered and so be used over again. This will free the cotton completely from grease.

SIZES OF TIN-WARE OF DIFFERENT KINDS.

		Diam. of bot.	Diam. of top.	Heig't
		inches	inches	inches
Dippers.	½ gal.	4	6½	4
"	1 pt.	3¾	4¼	2¾
Coffee Pots.	1 gal.	7	4	8½
" "	3 qts.	6	3½	8½
Pans.	20 qts.	13	19½	8
"	16 qts.	11¼	18	6¼
"	14 qts.	9¼	15¼	6¼
"	10 qts.	11	14¾	4⅛
"	6 qts.	9	12¾	4
"	2 qts.	6	9	3¾
"	3 pts.	5¾	8¼	2¾
"	1 pt.	4	6¼	2¾
Pie Pans		7½	9	1½
Large Wash Bowl		5¾	11	5
Small Wash Bowl		5½	9½	5
Milk Strainer		5½	9½	3½
Pails and Dish Kettles	14 qts.	9	13	9
" " "	10 qts.	7	11½	9
" " "	6 qts.	5½	9¼	6½
" " "	2 qts.	4	6¼	4
Colander.		5¾	11	5
Measures for Druggists, Beer, &c.	2 gals.	6	10½	8⅜
	1 gal.	8¾	3¾	7½
	½ gal.	6⅝	3⅛	6
	1 qt.	5⅛	2½	4⅞
	1 pt.	4	2	4
	½ pt.	3¾	1¾	3⅛
Measures of other forms.	1 gal.	6⅛	5½	9½
	½ gal.	4⅞	4	8
	1 qt.	4	3½	5⅜
	1 pt.	3¾	2⅛	4¾
	½ pt.	2⅞	2⅜	3⅛

TIN CANS.—SIZE OF SHEET, FOR FROM 1 TO 100 GALLONS.

For 1 gallon,	7 by 20	inches.	For 25 gallons,	30 by 56	inches
3½ "	10 by 28	"	40 "	36 by 63	"
5 "	12 by 40	"	50 "	40 by 70	"
6 "	14 by 40	"	75 "	40 by 84	"
10 "	20 by 42	"	100 "	40 by 98	"
15 "	30 by 42	"			

This includes all the laps, seams, &c., which will be found sufficiently correct for all practical purposes.

GOLD LACQUER FOR TIN.—TRANSPARENT, ALL COLORS.—Alcohol in a flask, ½ pt.; add gum shellac, 1 oz.; turmeric, ½ oz.; red sanders, 3 ozs. Set the flask in a warm place, shake frequently for 12 hours or more, then strain off the liquor, rinse the bottle, and return it, corking tightly for use.

When this varnish is used, it must be applied to the work freely and flowing, and the articles should be hot when applied. One or more coats may be laid on, as the color is required more or less light or deep. If any of it should become thick from evaporation, at any time, thin it with alcohol. And by the following modifications, all the various colors are obtained.

2. ROSE COLOR.—Proceed as above, substituting ¼ oz. of finely ground best lake in place of the turmeric.

3. BLUE.—The blue is made by substituting pulverized Prussian blue, ½ oz., in place of the turmeric

4. PURPLE.—Add a little of the blue to the *first*.

5. GREEN.—Add a little of the rose-color to the *first*.

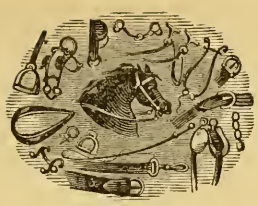
CRYSTALLIZED TIN-PLATE.—The figures are more or less beautiful and diversified, according to the degree of heat and relative dilution of the acid. Place the tin-plate, slightly heated, over a tub of water, and rub its surface with a sponge dipped in a liquor composed of 4 parts of aquafortis and 2 of distilled water, holding 1 part of common salt or sal-ammoniac in solution. Whenever the crystalline spangles seem to be thoroughly brought out, the plate must be immersed in water, washed with a feather or a little cotton (taking care not to rub off the film of tin that forms the feathering), forthwith dried with a low heat, and coated with a lacquer varnish, otherwise it loses its lustre in the air. If the whole surface is not plunged at once in cold water, but if it be partially cooled by sprinkling water on it, the crystallization will be finely variegated with large and small figures. Similar results will be obtained by blowing cold air through a pipe on the tinned surface, while it is just passing from the fused to the solid state.

TO CRYSTALLIZE TIN.—Sulphuric acid, 4 oz.; soft water, 2 to 3 oz.; according to strength of the acid; salt, 1¼ ozs. Mix. Heat the tin hot over a stove, then, with a sponge apply the mixture, then wash off directly with clean water. Dry the tin, and varnish with demar varnish.

TINNING SMALL ARTICLES.—Dissolve as much zinc scraps in muriatic acid as it will take up, let it settle, then decant the clear, and it is ready for use. Next prepare a suitable iron vessel, set it over the fire, put your tin therein, and melt it, and put as much mutton or beef tallow as will cover the tin about ¼ inch thick. This prevents the oxidation of the metal; but be very careful that the tallow does not catch fire. The iron, or any other metal to be tinned, must be *well cleaned*, either with scraping, filing, polishing with sand, or immersed in diluted vitriol. Proceed to wet the articles in the zinc solution, then carefully immerse them in the tallow and melted tin; in a very short time they will become perfectly tinned, when they may be taken out.

JAPANNER'S GOLD SIZE.—Gum ammoniac, 1 lb.; boiled oil, 8 oz.; spirits turpentine, 12 ozs. Melt the gum, then add the oil, and lastly spirits turpentine.

BLACK VARNISH FOR IRON WORK.—Asphaltum, 1 lb.; lampblack, ¼ lb.; resin, ½ lb.; spirits turpentine, 1 quart; linseed oil, just sufficient to rub up the lampblack with before mixing it with the others. Apply with a camel's hair brush



TANNERS, LEATHER DRESSERS, HARNESS MAKERS, &c.

Different methods of Tanning, Sizing, Blacking, Cements, Polishes, Dyes, &c.

Waterproof Varnish for Harness.—India-rubber, ½ lb.; spts. turpentine, 1 gal.; dissolve to a jelly, then take hot linseed oil equal parts with the mass, and incorporate them well over a slow fire.

Blacking for Harness.—Beeswax, ½ lb.; ivory black, 2 ounces; spts. of turpentine, 1 oz. Prussian blue, ground in oil, 1 oz.; copal varnish, ½ oz.; melt the wax and stir into it the other ingredients, before the mixture is quite cold; make it into balls, rub a little upon a brush, apply it upon the harness and polish lightly with silk.

Best Harness Varnish Extant.—Alcohol, 1 gallon; white turpentine, 1½ lb.; gum shellac, 1½ lb.; Venice turpentine, 1 gill. Let them stand by the stove till the gums are dissolved, then add sweet oil, 1 gill; and color it, if you wish, with lampblack, 2 oz. This will not crack like the old varnish.

Harness Oil.—Neat's-foot oil, 1 gal.; lampblack, 4 oz. Mix well.

Bridle Stain.—Skimmed milk, 1 pt.; spirits of salts, ½ oz.; spts. of red lavender, ½ oz.; gum arabic, 1 oz.; and the juice of 2 lemons; mix well together, and cork for use; apply with a sponge; when dry polish with a brush or a piece of flannel. If wished paler, put in less red lavender.

Brilliant Varnish for Leather.—Take four ounces of shellac, half an ounce of lamp-black, and place them in a stoneware vessel, into which pour about one and a quarter pounds of alcohol and cover it with a moist bladder. Let them be frequently shaken for about 24 hours. After this puncture the bladder and add half an ounce of turpentine, and leave the whole for about 24 hours longer. Repeated applications of this will crack the leather, but for some purposes it is very useful.

Keeping Harness Pliable.—It is said that by adding a little glycerine to the grease applied to harness, it will be kept in a soft and pliable state, in spite of the ammoniacal exhalations of the stable, which tend to make it brittle.

Tanning.—The first operation is to soak the hide, as no hide can be properly tanned unless it has been soaked and broken on a fleshing beam. If the hide has not been salted add a little salt and soak it in soft water. In order to be thoroughly soaked, green hides should remain in the liquor from 9 to 12 days; of course the time varies with the thickness of the hide. The following liquor is used to remove hair or wool, viz.: 10 gals. cold water (soft); 8 qts. slaked lime, and the same quantity of wood ashes. Soak until the hair or wool will pull off easily. As it frequently happens it is desirable to cure the hide and keep the hair clean, the following paste

should be made, viz.: equal parts of lime and hard wood ashes (lime should be slaked and made into a paste with soft water). This should be spread on the flesh side of the hide and the skin rolled up flesh side in and placed in a tub just covering it with water. It should remain 10 days or until the hair will pull out easily, then scrape with a knife. The skins of animals are composed mainly of glue or gluten. This is soluble, and the principle derived from the bark, tannin or tannic acid is also to a considerable extent soluble; when the latter is allowed to act upon the former, chemical combination takes place, and leather is produced, which is insoluble

CHEAP TANNING WITHOUT BARK OR MINERAL ASTRINGENTS.—The astringent liquor is composed of water, 17 gals.; Aleppo galls, ½ lb.; Bengal catechu, 1½ oz., and 5 lbs. of tormentils or septfoil root. Powder the ingredients, and boil in the water 1 hour; when cool put in the skins (which must be prepared by being plunged into a preparation of bran and water for two days previously); handle them frequently during the first 3 days, let them alone the next 3 days, then handle three or four times in one day let them lie undisturbed for 25 days more, when the process will be complete.

NEW TANNING COMPOSITION.—*For harness leather*, 4 lbs. catechu, 3 pts. common lye, 3 oz. of alum. *For wax leather* (split leather), 3 lbs. catechu, 3 pts. common lye, 3 ozs. alum. For calf-skins, 2 lbs. catechu; 3 pts. lye. *For sheep-skins*, 1 lb. catechu, 1 pt. lye, 1 oz. alum. The catechu by itself will make the leather hard and brittle, the lye will soften it; the alum being only used for coloring, can be dispensed with or other matter used in its place. The mixture is in every case boiled, and the leather is then immersed in it long enough to be thoroughly tanned, for which purpose the harness leather should be steeped from 18 to 20 days, wax leather from 12 to 14 days, calf skins from 7 to 9 days, and sheep-skins from 2 to 4 days.

DEER SKINS.—TANNING AND BUFFING FOR GLOVES.—For each skin, take a bucket of water, and put it into 1 qt. of lime; let the skin or skins lie in from 3 to 4 days; then rinse in clean water, hair, and grain; then soak them in cold water to get out the glue; now scour or pound in good soap suds for half an hour; after which take white vitriol, alum, and salt, 1 tablespoonful of each to a skin; these will be dissolved in sufficient water to cover the skin, and remain in it for 24 hours; wring out as dry as convenient and spread on with a brush ½ pint of curriers' oil, and hang in the sun about 2 days; after which you will scour out the oil with soap-suds, and hang out again until perfectly dry; then pull and work them until they are soft; and if a reasonable time does not make them soft, scour out in suds again as before, until complete. The oil may be saved by pouring or taking it from the top of the suds, if left standing a short time. The buff color is given by spreading yellow ochre evenly over the surface of the skin when finished, rubbing it well with a brush.

TANNING WITH ACID.—After having removed the hair, scouring, soaking and pounding in the suds, &c., as in the last recipe, in place of the white vitriol, alum, and salt as there mentioned, take oil of vitriol (sulphuric acid) and water, equal parts of each, and thoroughly wet the flesh-side of the skin with it, by means of a sponge or cloth upon a stick; then folding up the skin, letting it stand for 20 minutes only, having ready a solution of sal-soda and water, say 1 lb. to a bucket of water, and soak the skin or skins in that for two hours, when you will wash in clean water, and apply a little dry salt, letting lie in the salt over night, or that length of time; then remove the flesh with a blunt knife, or if doing business on a large scale, by means of the regular beam and flesh knife; when dry, or nearly so, soften by pulling and rubbing with the hands, and also with a piece of pumice stone. This of course is the quickest way of tanning, and by only wetting the skins with the acid, and soaking out in 20 minutes, they are not rotted.

ANOTHER METHOD.—Oil of vitriol, ½ oz.; salt, 1 teacup; milk, sufficient to handsomely cover the skin, not exceeding 3 qts.; warm the milk, then add

the salt and vitriol; stir the skin in the liquid 40 minutes, keeping it warm; then dry, and work it as directed in the above.

CANADIAN PROCESS.—The Canadians make four liquors in using the japonica. The FIRST liquor is made by dissolving, for 20 sides of upper, 15 lbs. of terra japonica in sufficient water to cover the upper being tanned. The SECOND liquor contains the same amount of japonica, and 8 lbs. of saltpetre also. The THIRD contains 20 lbs. of japonica and 4½ lbs. of alum. The FOURTH liquor contains only 15 lbs. of japonica, and 1½ lbs. of sulphuric acid; and the leather remains 4 days in each liquor for upper; and for sole the quantities and time are both doubled. They count 50 calf-skins in place of 20 sides of upper, but let them lie in each liquor only 3 days.

PROCESS OF TANNING CALF, KIP, AND HARNESS LEATHER IN FROM 6 TO 30 DAYS.—For a 12-lb. calf-skin, take 3 lbs. of terra japonica, common salt, 2 lbs.; alum, 1 lb.; put them in a copper kettle with sufficient water to dissolve the whole without boiling. The skin will be lined, haired, and treated every way as for the old process, when it will be put into a vessel with water to cover it, at which time you will put in 1 pint of the composition, stirring it well, adding the same night and morning for three days, when you will add the whole, handling 2 or 3 times daily, all the time tanning; you can continue to use the tanning liquid by adding half the quantity each time, by keeping these proportions for any amount. If you desire to give a dark color to the leather, you will put in 1 lb. of Sicily sumac; kip skins will require about 20 days, light horse hides for harness 30 days, calf-skins from 6 to 10 days at most.

TO TAN RAW HIDE.—When taken from the animal, spread it flesh side up; then put 2 parts of salt, 2 parts of saltpetre and alum combined, make it fine, sprinkle it evenly over the surface, roll it up, let it alone a few days till dissolved; then take off what flesh remains, and nail the skin to the side of a barn in the sun, stretch tight; to make it soft like harness leather, put neat's-foot oil on it, fasten it up in the sun again; then rub out all the oil you can with a wedge-shaped stick, and it is tanned with the hair on.

TO TAN FUR SKINS, &C.—To remove the legs and useless parts, soak the skin soft and then remove the fleshy substances, and soak it in warm water one hour. Now take for each skin, borax, saltpetre, and glauber-salt, of each ½ oz., and dissolve or wet with soft water sufficient to allow it to be spread on the flesh-side of the skin. Put it on with a brush thickest in the centre or thickest part of the skin, and double the skin together, flesh side in; keeping it in a cool place for 24 hours, not allowing it to freeze. Then wash the skin clean, and take sal-soda, 1 oz.; borax, ½ oz.; refined soap, 2 oz.; melt them slowly together, being careful not to allow them to boil, and apply the mixture to the flesh side at first. Boil up again and keep in a warm place for 24 hours; then wash the skin clean again as above, and have saleratus, 2 oz., dissolved in hot water sufficient to well saturate the skin; take alum, 4 oz.; salt, 8 oz.; and dissolve also in hot rain water; when sufficiently cool to allow the handling of it without scalding, put in the skin for 12 hours; then wring out the water and hang up for 12 hours more to dry. Repeat this last soaking and drying 2 or 3 times, according to the desired softness of the skin when finished. Lastly, finish by pulling and working, and finally by rubbing with a piece of pumice-stone and fine sand-paper. This works like a charm on sheep-skins, fur skins, dog, wolf, bear-skins, &c.

TO TAN MUSKRAT SKINS WITH THE FUR ON.—First, for soaking, to 10 gals. cold soft water, add 8 parts of wheat bran; old soap, ½ pt.; pulverized borax, 1 oz.; sulphuric acid, 2 ozs. If the skins have not been salted, add salt, 1 pt. Green skins should not be soaked more than 8 to 10 hours. Dry ones should soak till very soft. The sulphuric acid hastens the soaking process. For tan liquor, to 10 gals. warm soft water, add bran, ½ bushel; stir well, and let it ferment in a warm room. Then add slowly, sulphuric acid, 2½ lbs.; stir all the time. Muskrat should remain in about 4 hours; then take out and rub with a fleshing knife; an old chopping knife with the edge taken off will do. Then work it over a beam until entirely dry.

To Tan Skins with the Fur on.—The following process for tanning sheep skins with the wool on for mats or mittens—if for mittens the wool should be trimmed off evenly to half or three-fourths of an inch in length —we have seen recommended. Wash the wool thoroughly in cold soapsuds, and rinse. For two skins dissolve ½ a pound of alum and salt in a little hot water, which put into a tub of enough cold water to cover the skins ; soak twelve hours and then hang them over a pole. Before entirely dry spread and stretch them on a board to dry, and while a little damp sprinkle on the flesh side of each skin an ounce of saltpetre and an ounce of alum pulverized and mixed ; after rubbing this in well, put the flesh sides together and lay in the shade for two or three days, turning the under skin uppermost every day. When perfectly dry scrape the flesh side with a blunt knife, and rub with pumice or rotten stone, till soft and pliable.

The following is an excellent plan for tanning any kind of skins with the fur on :—After having cut off the useless parts, and softened the skin by soaking, remove the fatty matter from the inside and soak it in warm water for an hour. Next, mix equal parts of borax, saltpetre, and glauber salts (sulphate of soda) in the proportion of about ½ ounce of each for each skin, with sufficient water to make a thin paste ; spread this with a brush over the inside of the skin, applying more on the thicker parts than on the thinner ; double the skin together, flesh side inwards, and place it in a cool place. After standing 24 hours, wash the skin clean, and apply, in the same manner as before, a mixture of 1 ounce sal soda, ½ ounce borax and 2 ounces hard white soap, melted slowly together without being allowed to boil ; fold together again and put away in a warm place for 24 hours. After this, dissolve 4 ounces alum, 8 ounces salt, and 2 ounces saleratus, in sufficient hot rain water to saturate the skin ; when cool enough not to scald the hands, soak the skin in it for 12 hours ; then wring out and hang it up to dry. When dry repeat this soaking and drying two or three times till the skin is sufficiently soft. Lastly smooth the inside with fine sand. paper and pumice stone.

Curriers' Size.—Take of sizing, 1 qt. ; soft soap, 1 gill ; stuffing, 1 gill ; sweet milk, ½ pt. ; boil the sizing in water to a proper consistence, strain, and add the other ingredients ; and when thoroughly mixed, it is ready for use.

Curriers' Paste.—*First Coat.*—Take of water, 2 qts. ; flour, ½ pint ; Castile soap, 1 oz. ; make into paste. *Second Coat.*—Take of first paste, ½ pt. ; gum tragacanth, 1 gill ; water, 1 pt. ; mix all together. This will finish 18 sides of upper.

Curriers' Skirting.—This is for finishing skirting and the flesh of harness leather, in imitation of oak tanning. Take of chrome yellow, ½ lb.; yellow ochre, 1 lb. ; cream of tartar, 1 oz. ; soda, ½ oz. ; paste, 5 qts. ; mix well. This will finish 12 sides.

Skirting.—For the grain to imitate oak tan. Take of chrome yellow, ½ lb. ; yellow ochre, ½ lb. ; cream of tartar, 1 oz. ; soda, 1 oz. ; paste, 2 qts.; spirits of turpentine, 1 pt.; mix well. This will finish 12 sides.

Dyes for Morocco and Sheep Leather.—(*Blue.*)—Blue is given by steeping the subject a day in urine and indigo, then boiling it with alum ; or, it may be given by tempering the indigo with red wine, and washing the skin therewith. *Another.*—Boil elderberries or dwarf-elder, then smear and wash the skins therewith and wring them out ; then boil the elderberries as before in a solution of alum water, and wet the skins in the same manner once or twice, dry them, and they will be very blue. (*Red.*)—Red is given by washing the skin and laying them 2 hours in gall, then wringing them out, dipping them in a liquor made with ligustrum, alum, and verdigris, in water, and lastly in the dye made of Brazilwood boiled with lye. (*Purple.*)—Purple is given by wetting the skins with a solution of roche alum in warm water, and when dry, again rubbing them with the hand with a decoction of logwood in cold water. (*Green.*)—Green is given by smearing the skin with sap-green and alum boiled. (*Dark Green.*)—Dark green is given with

steel-filings and sal-ammoniac, steeped in wine till soft, then smeared over the skin, which is to be dried in the shade. (*Yellow.*)—Yellow is given by smearing the skin over with aloes and linseed-oil dissolved and strained, or by infusing in weld. (*Light Orange.*)—Orange color is given by smearing it with fustic berries boiled in alum water, or for deep orange, with turmeric. (*Sky-color.*)—Sky-color is given with indigo steeped in boiling water, and the next morning warmed and smeared over the skin. *See Dyers' Department.*

To Dye Leather Yellow.—Picric acid gives a good yellow without any mordant; it must be used in very dilute solution, and not warmer than 70° Fahr., so as not to penetrate the leather.

Green Dye for Leather.—Aniline blue modifies picric acid to a fine green. In dyeing the leather, the temperature of 85° Fahr. must never be exceeded. *See Aniline Dyes in Dyers' Department.*

Best Color for Shoe and Harness Edge.—Alcohol, 1 pint; tincture of iron, 1½ ozs.; extract logwood, 1 oz.; pulverized nutgalls, 1 oz.; soft water, ½ pint; sweet oil, ½ oz.; put this last into the alcohol before adding the water. Nothing can exceed the beautiful finish imparted to the leather by this preparation.

Cheap Color for the Edge.—Soft water, 1 gallon; extract logwood, 1 oz.; boil till the extract is dissolved; remove from the fire, add copperas, 2 ozs., bichromate of potash, and gum arabic, of each ½ oz., all to be pulverized.

Beautiful Bronze for Leather.—Dissolve a little of the so-called insoluble aniline violet in a little water, and brush the solution over the leather; after it dries repeat the process.

Superior Edge Blacking.—Soft water, 5 gallons; bring to a boil, and add 8 ozs. logwood extract, pulverized; boil 3 minutes, remove from the fire, and stir in 2½ ozs. gum arabic, 1 oz. bichromate of potash, and 80 grains prussiate of potash.

For a small quantity of this, use water, 2 qts.; extract of logwood, ¾ oz.; gum arabic, 96 grains; bichromate of potash, 48 grains; prussiate of potash, 8 grains. Boil the extract in the water 2 minutes; remove from the fire and stir in the others, and it is ready for use.

For tanners' surface blacking, which is not required to take on a high polish, the gum arabic may be omitted.

French Finish for Leather.—Take a common wooden pailful of scraps (the legs and pates of calf-skins are best), and put a handful each of salt and alum upon them, and let stand three days; then boil until they get a thick paste; in using, you will warm it, and in the first application put a little tallow with it, and for a second time a little soft soap, and use it in the regular way of finishing, and your leather will be soft and pliable, like French leather.

French Patent Leather.—Work into the skin with appropriate tools 3 or 4 successive coatings of drying varnish, made by boiling linseed oil with white lead and litharge, in the proportion of one pound of each of the latter to one gallon of the former, and adding a portion of chalk or ochre, each coating being thoroughly dried before the application of the next. Ivory-black is then substituted for the chalk or ochre, the varnish thinned with spirits of turpentine, and five additional applications made in the same manner as before, except that it is put on thin and not worked in. The leather is rubbed down with pumice-stone, in powder, and then placed in a room at 90 degrees, out of the way of dust. The last varnish is prepared by boiling ½ lb. asphaltum with 10 lbs. of the drying oil used in the first stage of the process, and then stirring in 5 lbs. copal varnish and 10 lbs. of turpentine. It must have 1 month's age before using it.

Brilliant French Varnish for Leather.—Spirits of wine, ¾ pint; vinegar, 5 pints; gum senegal in powder, ½ lb.; loaf sugar, 6 ozs.; powdered galls, 2 ozs.; green copperas, 4 ozs. Dissolve the gum and sugar in the water; strain, and put on a slow fire, but don't boil; now put in the galls, copperas, and the alcohol; stir well for five minutes; set off; and when

nearly cool, strain through flannel, and bottle for use. It is applied with a pencil brush. Most superior.

LIQUID JAPAN FOR LEATHER.—Molasses, 8 lbs.; lampblack, 1 lb.; sweet oil, 1 lb.; gum arabic, 1 lb.; isinglass, 1 lb. Mix well in 32 lbs. water; apply heat; when cool, add 1 quart alcohol; an ox's gall will improve it.

FRENCH POLISH OR DRESSING FOR LEATHER.—Mix 2 pts. best vinegar with 1 pt. soft water; stir into it ¼ lb. glue, broken up, ½ lb. logwood chips, ½ oz. of finely powdered indigo, ½ oz. of the best soft soap, ¼ oz. of isinglass; put the mixture over the fire, and let it boil 10 minutes or more; then strain, bottle, and cork. When cold, it is fit for use. Apply with a sponge.

GOLD VARNISH.—Turmeric, 1 drachm; gamboge, 1 drachm; turpentine, 2 pints; shellac, 5 ozs.; sandarac, 5 ozs.; dragon's blood, 8 drachms; thin mastic varnish, 8 ozs.; digest with occasional agitation for 14 days; then set aside to fine; and pour off the clear.

GRAIN BLACK FOR HARNESS LEATHER.—First stain in tallow; then take spirits of turpentine, 1 pint; cream of tartar, 1 oz.; soda, 1 oz.; gum shellac, ½ oz.; thick paste, reduced thin, 2 quarts. Mix well. This will finish 12 sides.

TO UTILIZE LEATHER SCRAPS.—First clean the scraps, then soak them in water containing 1 per cent. of sulphuric acid until the material becomes soft and plastic, then compress into blocks and dry by steam. In order to soften the blocks, 1 lb. of glycerine is added to 100 lbs. of the material; they are then passed through rollers, and brought to the proper thickness to be used as inner soles of boots and shoes.

SIZING FOR BOOTS AND SHOES IN TREEING OUT.—Water, 1 quart; dissolve in it, by heat, isinglass, 1 oz.; adding more water to replace loss by evaporation; when dissolved, add starch, 6 ozs.; extract of logwood, beeswax, and tallow, of each, 2 ozs. Rub the starch up first by pouring on sufficient boiling water for that purpose. It makes boots and shoes soft and pliable, and gives a splendid appearance to old stock on the shelves.

BLACK VARNISH FOR THE EDGE.—Take 98 per cent. alcohol, 1 pint; shellac, 3 ozs.; resin, 2 ozs.; pine turpentine, 1 oz.; lampblack, ½ oz.; mix: and when the gums are all cut, it is ready for use. This preparation makes a most splendid appearance when applied to boot, shoe, or harness edge, and is equally applicable to cloth or wood, where a gloss is required after being painted.

BEAUTIFUL STAINS FOR BOOTS, SHOES AND LEATHER GOODS.—Soft water, 1 pt.; oxalic acid, 2 tablespoonfuls or more; if required stronger, dissolve, and for a red color, add finely pulverized rose-pink, vermilion or drop lake. *Blue*, add finely pulverized Prussian blue, or indigo. *Yellow*, king's yellow, yellow ochre, &c. *White*, flake white. *Green*, blue and yellow mixed. *Orange*, red and yellow mixed. *Purple*, red and blue mixed. Pulverize the ingredients well before mixing with the water and acid. Any other shade desired can be selected from the "*Compound colors*" in the next department.

WATERPROOF OIL-BLACKING.—Camphene, 1 pint; add all the India-rubber it will dissolve; curriers' oil, 1 pint; tallow, 7 lbs.; lampblack, 2 ozs. Mix thoroughly by heat.

SHOEMAKERS' HEEL BALL.—Beeswax, 8 oz.; tallow, 1 oz.; melt, and add powdered gum arabic, 1 oz., and lampblack to color.

BEST HEEL BALL.—Melt together beeswax, 2 lbs.; suet, 3 ozs.; stir in ivory black, 4 ozs., lampblack, 3 oz., powdered gum arabic, 2 oz., powdered rock candy, 2 oz., mix and when partly cold pour into tin or leaden moulds.

CHANNELLERS AND SHOEMAKERS' CEMENT.—India-rubber dissolved to a proper consistence in sulphuric ether.

CEMENT FOR LEATHER OR RUBBER SOLES AND LEATHER BELTING.—Gutta percha, 1 lb.; India-rubber, 4 ozs.; pitch, 2 ozs.; shellac, 1 oz.; oil, 2 ozs.; melt, and use hot.

GERMAN BLACKING.—Ivory-black, 1 part; molasses, ¼ part; sweet oil, ⅛ part; mix, as before; then stir in a mixture of hydrochloric acid, ⅛ part;

oil of vitriol, ¼ part; each separately diluted with twice its weight of water before mixing them. This forms the ordinary paste blacking of Germany, according to Liebig.

Oil Paste Blacking.—Ivory-black, 4 lbs.; molasses, 2 lbs.; sweet oil, 1 lb.; oil of vitriol, 3 lbs.; mix and put in tins.

Polish for Patent Leather.—The following is given by the *London Chemist and Druggist*:

Whites of two eggs, one tablespoonful of spirits of wine, two large lumps of sugar, finely powdered ivory-black, as much as may be sufficient to produce the necessary blackness and consistence. To be laid on with a soft sponge, lightly, and afterwards gently rubbed with a soft cloth.

Superior Water-proof Composition for Leather.—Boiled oil, sixteen parts; spirits turpentine, two parts; beeswax and resin one part each; Venice turpentine, two parts; mix and use hot.

Waterproof Composition for Boots and Shoes.—Beeswax, 2 ozs.; beef suet, 4 ozs.; resin, 1 oz.; neats-foot oil, 2 ozs.; lampblack, 1 oz. Melt together. Sells well.

Fine Blacking for Shoes.—Take four ounces of ivory-black, three ounces of the coarsest sugar, a tablespoonful of sweet oil, and a pint of small beer; mix them gradually till cold.

Oil Paste Blacking.—Take oil of vitriol, two ounces; ivory-black, one pound; molasses, five ounces; tanner's oil, five ounces; mix the vitriol and oil together, and let it stand a day; then add the ivory-black and molasses, and stir it well together till it makes a thick paste.

Liquid Blacking.—Ivory black, 2 lbs.; molasses, 2 lbs.; sweet oil, 1 lb.; rub together till well mixed; then add oil vitriol, ¾ lb.; add coarse sugar, ½ lb.; and dilute with beer bottoms; this cannot be excelled.

On Rubber Goods.—As many parties require to use rubber goods who are entirely ignorant of the cheap mixtures which are vended in large quantities, at enormous profits by manufacturers, I have thought proper in this place to irradiate the subject with a little "light" for the benefit of those whom "it may concern," and accordingly present the formulæ for compounding the different mixtures which enter into the composition of many articles sold quite extensively as *pure rubber* goods, but which, owing to large adulterations, in many cases cost 75 per cent. less than the prices charged for them. The first I shall present is for

Light Buffer Springs.—Grind together clear Java rubber, 25 lbs.; Para rubber, 5 lbs.; common magnesia, 10 lbs.; pure sulphur, 25 ozs. This is brown at first, but in a few days turns grey or white, and just sinks in water. Springs made from this compound, $4\frac{1}{2} \times 2\frac{1}{2} \times 1$, pressed to half an inch, showed $3\frac{1}{2}$ tons on the dial.

Grey Packing for Marine Engines, &c.—Grind together cleaned Java rubber, 5 lbs.; Para rubber, 25 lbs.; oxide of zinc, 16 lbs.; carbonate of magnesia, 6 lbs.; Porcelain or Cornwall clay, 3 lbs.; red lead, 2 lbs.; pure sulphur, 30 ozs. It may be proper to state that good purified Java rubber might be substituted by engineers with good effect for Para rubber in the above and some other compositions.

Rag Packing for Valves, Bearing Springs, &c.—This is made principally from the useless cuttings in the manufacture of India-rubber coats, when the gum is run or spread on calico foundations. Proportions as follows: grind together useless scraps, 35 lbs.; black-lead, 18 lbs.; Java gum, 16 lbs.; yellow sulphur, 1 lb.

Composition for Suction Hose for Fire Engines, &c.—Grind together Java rubber, 20 lbs.; Para do., 10 lbs.; white lead, 14 lbs.; red lead, 14 lbs.; yellow sulphur, 1½ lbs. This is spread upon flax cloth, which weighs 10, 16, and 32 ozs. to the square yard.

Common Black Packing.—Grind together, Java rubber, 15 lbs.; Para do., 15 lbs.; oxide of zinc, 15 lbs.; China or Cornwall clay, 15 lbs.; yellow sulphur, 28 ozs.

Common White Buffer Rings, &c.—Grind together Java rubber, 30

lbs.; oxide of zinc, 18 lbs.; carbonate of magnesia, 6 lbs.; clean chalk or whiting, 6 lbs.; flour of sulphur, 2 lbs.

VULCANITE, OR EBONITE.—If the amount of sulphur added to the prepared rubber amounts to 10 per cent. and the operations of vulcanizing is performed in close vessels, at a temperature exceeding 300, or the heat required for VULCANIZING INDIA-RUBBER as described under that head, which see, an article will be produced known as *vulcanite, or ebonite.* It is a black, hard, elastic substance, resembling horn in its texture and appearance, and capable of taking a very high polish. It is of great use in the arts, and is largely manufactured for making combs, door handles, and hundreds of articles hitherto made in ivory or bone. Its electrical properties also are very great.

BEST PURE SPRINGS, OR WASHERS.—Grind together Para gum, 30 lbs.; oxide of zinc, 5 lbs.; carb. magnesia, 2 lbs.; common chalk, 3 lbs.; Porcelain or Cornwall clay, 2 lbs.; pure sulphur, 30 ozs.

COMPANION QUALITY TO ABOVE.—Para rubber, 30 lbs.; oxide of zinc, 5 lbs.; Porcelain or Cornwall clay, 5 lbs.; pure sulphur, 32 ozs.

"HYPO" CLOTH FOR WATERPROOF COATS.—Grind together clean Java gum, 30 lbs.; lampblack, 5 lbs.; dry chalk or whiting, 11 lbs.; sulphuret of lead, 5 lbs. This composition is applied to waterproof garments.

TO VULCANIZE INDIA-RUBBER.—The vulcanizing process patented by the late Charles Goodyear, consists in incorporating with the rubber from 3 to 10 per cent. of sulphur, together with various metallic oxides, chiefly lead and zinc, the quantity of the latter articles being regulated by the degree of elasticity, etc., required in the desired article. The goods of one large establishment are vulcanized in cylindrical wrought iron steam heaters, over 50 feet long and from 5 to 6 feet in diameter. These heaters have doors opening on hinges at one end, and through these doors the goods to be vulcanized are introduced on a sort of railway carriage, then, after the door is shut, steam is let on, and a temperature of from 250° to 300° of heat is kept up for several hours, the degree of heat being ascertained by means of thermometers attached to the heaters. The value, solidity, and quality of the goods is much increased by keeping the articles under the pressure of metallic moulds or sheets while undergoing this process. The whole process requires careful manipulation and great experience to conduct it properly.

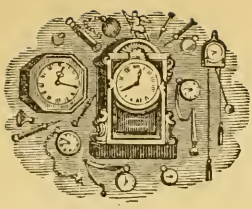
TO DEODORIZE RUBBER.—Cover the articles of rubber with charcoal dust, place them in an enclosed vessel, and raise the temperature to 94° Fahr., and let it remain thus for several hours. Remove and clean the articles from the charcoal dust, and they will be found free from all odor.

GUTTA-PERCHA AND RUBBER WASTE.—The waste is cut into small pieces, and 100 lbs. of the same are placed in a well-closed boiler with 10 lbs. of bisulphide of carbon and 4 ozs. absolute alcohol, well stirred; then the boiler is closed, and left a few hours to soak. After this time it is found to be changed into a soft dough mass, which, after being ground or kneaded, is fit to be formed into any shape, when the solvent will evaporate. If too much of the latter has been used, a thick unmanageable liquid is obtained.

TO REPAIR LEAKAGES IN FIRE ENGINE HOSE.—Pass a round bar of iron into the hose under the leak, then rivet on a patch of leather, previously coated with marine glue.

TO REPAIR RUBBER HOSE.—Cut the hose apart where it is defective; obtain from any gasfitter a piece of iron pipe 2 or 3 inches long, twist the hose over it until the ends meet, wrap with strong twine, well waxed, and it will last a long time.

VARNISH FOR FADED RUBBER GOODS.—Black Japan varnish diluted with a little linseed oil.



WATCHMAKING.

THE MODUS OPERANDI COMPLETE IN ALL ITS VARIOUS DETAILS, CLEANING, TEMPERING CASE AND OTHER SPRINGS, DRILLING HARD STEEL, PUTTING TEETH IN WATCHES AND CLOCKS, DETERMINING THE CORRECT DIAMETER OF A PINION BY MEASURING THE TEETH, ADJUSTING AND REGULATING, PUTTING IN BEAT, WEAKENING THE HAIR SPRING, VALUABLE AND USEFUL TABLES OF TRAINS OF WATCHES, SHOWING THE NUMBER OF TEETH IN THE WHEELS, LEAVES IN THE PINION, BEATS IN A MINUTE AND THE TIME THE WHEELS REVOLVE IN.

ON WATCH CLEANING.—The greatest care is necessary in taking the watch down, and separating its parts. First, remove the hands carefully, so as not to bend the slight pivots on which they work, next, remove the movement from the case, and take off the dial and dial wheels; next, let down the main spring by placing your bench key upon the arbor, or winding post, and turning as though you were going to wind the watch until the click rests lightly upon the ratchet; then with your screw-driver press the point of the click away from the teeth and ease down the springs; next, draw the screws, or pins, and remove the bridges of the train or the upper plate, as the case may be, next, remove the balance with the greatest care to avoid injuring the hair spring. The stud or small post into which the hair spring is fastened may be removed from the bridge or plate of most modern watches without unkeying the spring, by slipping a thin instrument, like the edge of a blade knife, under the corner of it and prying upward, this will save much trouble, as you will not have the hair-spring to adjust when you reset the balance. If the watch upon which you propose to work has an upper plate, as an American or an English lever for instance, loosen the lever before you have entirely separated the plates, otherwise it will hang and probably be broken. The watch being now taken apart, brush the dust away from its different parts, and subject them to a careful examination with your eye-glass. Assure yourself the teeth of the wheels and leaves of the pinions are all perfect and smooth; that the pivots are all straight, round, and highly polished; that the holes through which they are to work are not too large, and have not become oval in shape; that every jewel is smooth and perfectly sound; and that none of them are loose in their settings. See also that the escapement is not too deep or too shallow; that the lever or cylinder is perfect; that all the wheels have sufficient play to avoid friction, but not enough to derange their coming together properly that none of them work against the pillar-plate; that the balance turns horizontally and does not rub: that the hair-spring is not bent or wrongly

set so that the coils rub on each other on the plate, or on the balance; in short, that every thing about the whole movement is just as reason would teach you it should be. If you find it otherwise, proceed to repair in accordance with a carefully weighed judgment and the processes given in this chapter, after which clean; if not, the watch only needs to be cleaned, and, therefore, you may go on with your work at once.

To Clean.—The best process is to simply blow your breath upon the plate or bridge to be cleaned, and then to use your brush with a little prepared chalk. The wheels and bridges should be held between the thumb and finger in a piece of soft paper while undergoing the process; otherwise the oil from the skin will prevent their becoming clean. The pinions may be cleaned by sinking them several times into a piece of pith, and the holes by turning a nicely shaped piece of pivot wood into them, first dry, and afterwards oiled a very little with watch oil. When the holes pass through jewels, you must work gently to avoid breaking them.

The "Chemical Process."—Some watchmakers employ what they call the "Chemical Process" to clean and remove discoloration from watch movements. It is as follows:—

Remove the screws and other steel parts; then dampen with a solution of oxalic acid and water. Let it remain a few minutes, after which immerse in a solution made of one-fourth pound cyanuret potassa to one gallon rain water. Let it remain about five minutes, and then rinse well with clean water, after which you may dry in sawdust, or with a brush and prepared chalk, as suits your convenience. This gives the work an excellent appearance.

To prepare Chalk for Cleaning.—Pulverize your chalk thoroughly, and then mix it with clear rain water in the proportion to two pounds to the gallon. Stir well, and then let stand about two minutes. In this time the gritty matter will have settled to the bottom. Pour the water into another vessel slowly so as not to stir up the settlings. Let stand until entirely settled, and then pour off as before. The settlings in the second vessel will be your prepared chalk, ready for use as soon as dried. Spanish whiting, treated in the same way, makes a very good cleaning or polishing powder. Some operatives add a little jeweller's rouge, and we think it an improvement; it gives the powder a nice color at least, and therefore adds to its importance in the eyes of the uninitiated. In cases where a sharper polishing powder is required, it may be prepared in the same way from rotten-stone.

Pivot Wood.—Watchmakers usually buy this article of watch-material dealers. A small shrub known as Indian arrow-wood, to be met with in the northern and western states, makes an excellent pivot wood. It must be cut when the sap is down, and split into quarters so as throw the pith outside of the rod.

Pith for Cleaning.—The stalk of the common mullen affords the best pith for cleaning pinions. Winter, when the stalk is dry, is the time to gather it. Some use cork instead of pith, but it is inferior.

To Pivot.—When you find a pivot broken, you will hardly be at a loss to understand that the easiest mode of repairing the damage is to drill into the end of the pinion or staff, as the case may be, and having inserted a new pivot, turn it down to the proper proportions. This is by no means a difficult thing when the piece to be drilled is not too hard, or when the temper may be slightly drawn without injury to the other parts of the article.

To tell when the Lever is of proper Length.—You may readily learn whether or not a lever is of proper length, by measuring from the guard point to the pallet staff, and then comparing with the roller or ruby-pin table: the diameter of the table should always be just half the length measured on the lever. The rule will work both ways, and may be useful in cases where a new ruby-pin table has to be supplied.

To change Depth of Lever Escapement.—If you are operating on a

fine watch, the best plan is to put a new staff into the lever, cutting its pivots a little to one side, just as far as you desire to change the escapement. Common watches will not, of course, justify so much trouble. The usual process in their case is to knock out the staff, and with a small file cut the hole oblong in a direction opposite to that in which you desire to move your pallets ; then replace the staff, wedge it to the required position, and secure by soft soldering. In instances where the staff is put in with a screw, you will have to proceed differently. Take out the staff, pry the pallets from the lever, file the pin holes to slant in the direction you would move the pallets, without changing their size on the other side of the lever. Connect the pieces as they were before, and, with the lever resting on some solid substance, you may strike lightly with your hammer until the bending of the pins will allow the pallets to pass into position.

Compensation Balance of Chronometers.—The balance is a small piece of steel covered with a hoop of brass. The rim, consisting of the two metals, is divided at the two extremities, the one diametrical arm of the balance, so that the increase of temperature which weakens the balance springs contract, in a proportionate degree, the diameter of the balance, leaving the spring less resistance to overcome. This occurs from the brass expanding much more by heat than steel, and it therefore curls the semicircular arcs inwards, an action that will be immediately understood, if we conceive the compound bar of steel to be straight, as the heat would render the brass side longer and convex, and in the balance it renders it more curved. In the compensation balance, the two metals are united as follows : the disc of steel when turned and pierced with a central hole is fixed by a little screw-bolt and nut at the bottom of a small crucible, with a central elevation smaller than the disc ; the brass is now melted and the whole allowed to cool. The crucible is broken, the excess of brass is turned off in the lathe, the arms are made with the file as usual, the rim is tapped to receive the compensation screws or weights, and, lastly, the hoop is divided in two places at the opposite ends of its diametrical arm. The balance springs of marine chronometers, which are in the form of a screw, are wound into the square thread of a screw of the appropriate diameter and coarseness ; the two ends of the spring are retained by side screws, and the whole is carefully enveloped in platinum foil, and lightly bound with wire. The mass is next heated in a piece of gun barrel closed at one end, and plunged into oil, which hardens the spring almost without discoloring it, owing to the exclusion of the air by the close platinum covering, which is now removed, and the spring is let down to the blue before removal from the screwed block. The balance or hair spring of *common* watches are frequently left soft, those of the *best* watches are hardened in the coil upon a plain cylinder and are then curled into the spiral form between the edge of a blunt knife and the thumb, the same as in curling up a narrow ribbon or paper, or the filaments of an ostrich feather. The soft springs are worth 60 cents each, those hardened and tempered $1.26 each. This raises the value of the steel, originally less than 4 cents, to $2000 and $8000 respectively. It takes 3200 balance springs to weigh an ounce.

Watch Spring Manufacture.—Watch springs are hammered out of round steel wire, of suitable diameter until they fill the gauge, for width, which at the same time insures equality of thickness. The holes are punched in their extremities, and they are trimmed on the edge with a smooth file. The springs are then tied up with binding wire, in a loose *open* coil and heated over a charcoal fire upon a perforated revolving plate. They are hardened in oil and blazed off. The spring is now distended in a long metal frame, similar to that used for a saw blade, and ground and polished with emery and oil between lead blocks. By this time its elasticity appears quite lost, and it may be bent in any direction; its elasticity is, however, entirely restored by a subsequent hammering on a very bright anvil which puts the "*nature into the spring.*" The coloring is done over a flat plate of iron, or hood, under which a small spirit lamp is kept burning ; the spring

is continually drawn backward and forward, about two or three inches at a time, until it assumes the orange or deep blue tint throughout, according to the taste of the purchaser. By many the coloring is considered to be a matter of ornament and not essential. The last process is to coil the spring into the spiral form, that it may enter the barrel in which it is to be contained. This is done by a tool with a small axis and winch handles, and does not require heat.

To tell when Lever Pallets are of proper Size.—The clear space between the pallets should correspond with the outside measure, on the points of three teeth of the scape wheel. The usual mode of measuring for new pallets is to set the wheel as close as possible to free its self when in motion. You can arrange it in your depthing tool, after which the measurement between the pivot holes of the two pieces, on the pillar plate, will show you exactly what is required.

To lengthen Levers of Anchor-escapement Watches without Hammering or Soldering.—Cut square across with a screw-head file, a little back from the point above the fork, and, when you have thus cut into it to a sufficient depth, bend forward the desired distance the piece thus partially detached. In the event of the piece snapping off while bending—which, however, rarely happens—file down the point level with the fork, and insert a pin English lever style.

To Temper Case and other Springs of Watches.—Draw the temper from the spring, and fit it properly in its place in the watch ; then take it out and temper it hard in rain-water (the addition of a little table salt to the water will be an improvement); after which place it in a small sheet-iron ladle or cup, and barely cover it with linseed-oil: then hold the ladle over a lighted lamp until the oil ignites, let it burn until the oil is nearly, not quite consumed; then re-cover with oil and burn down as before ; and so a third time ; at the end of which, plunge it again into water. Main and hair springs may, in like manner, be tempered by the same process ; first draw the temper, and properly coil and clamp to keep it in position, and then proceed the same as with case-springs.

To make Red Watch Hands.—1 oz. carmine, 1 oz. muriate of silver, ½ oz. of tinner's japan ; mix together in an earthen vessel, and hold over a spirit-lamp until formed into a paste. Apply this to the watch hand, and then lay it over a copper plate, face side up, and heat the plate sufficiently to produce the color desired.

To Drill into Hard Steel.—Make your drill oval in form, instead of the usual pointed shape, and temper as hard as it will bear without breaking ; then roughen the surface where you desire to drill with a little diluted muriatic acid, and, instead of oil, use turpentine or kerosene, in which a little gum camphor has been dissolved, with your drill. In operating, keep the pressure on your drill firm and steady ; and if the bottom of the hole should chance to become burnished that the drill will not act, as sometimes happens, again roughen with diluted acid as before ; then clean out the hole carefully, and proceed again.

To Put Teeth in Watch or Clock Wheels without Dovetailing or Soldering.—Drill a hole somewhat wider than the tooth, square through the plate, a little below the base of the tooth ; cut from the edge of the wheel square down to the hole already drilled ; then flatten a piece of wire so as to fit snugly into the cut of the saw, and with a light hammer form a head on it like the head of a pin. When thus prepared, press the wire or pin into position in the wheel, the head filling the hole drilled through the plate, and the end projecting out, so as to form the tooth ; then with a sharp-pointed graver cut a small groove each side of the pin from the edge of the wheel down to the hole, and with a blow of your hammer spread the face of the pin so as to fill the grooves just cut. Repeat the same operation on the other side of the wheel, and finish off in the usual way. The tooth will be found perfectly riveted in on every side, and as strong as the original one, while in appearance it will be equal to the best dovetailing.

To Case-harden Iron.—If you desire to harden to any considerable depth, put the article into a crucible with cyanide of potassium, cover over and heat altogether, then plunge into water. This process will harden perfectly to the depth of one or two inches.

To tighten a Cannon Pinion on the Centre Arbor when too loose.—Grasp the arbor lightly with a pair of cutting nippers, and, by a single turn of the nippers around the arbor, cut or raise a small thread thereon.

To Frost Watch Movements.—Sink that part of the article to be frosted for a short time in a compound of nitric acid, muriatic acid, and table salt, one ounce of each. On removing from the acid, place it in a shallow vessel containing enough sour beer to merely cover it, then with a fine scratch brush scour thoroughly, letting it remain under the beer during the operation. Next wash off, first in pure water and then in alcohol. Gild or silver in accordance with any recipe in the plating department.

Rule for Determining the Correct Diameter of a Pinion by Measuring the Teeth of the Wheel that Matches into it.—The term full, as used below, indicates full measure from outside to outside of the teeth named, and the term centre, the measure from centre of one tooth to centre of the other tooth named, inclusive.

For diameter of a pinion of 15 leaves, measure, with calipers, a shade less than 6 teeth of the wheel, *full*.

For diameter of a pinion of 14 leaves, measure, with calipers, a shade less than 6 teeth of the wheel, *centre*.

For diameter of a pinion of 12 leaves, measure, with calipers, 5 teeth of the wheel, *centre*.

For diameter of a pinion of 10 leaves, measure, with calipers, 4 teeth of the wheel, *full*.

For diameter of a pinion of 9 leaves, measure, with calipers, a little less than 4 teeth of the wheel, *full*.

For diameter of a pinion of 8 leaves, measure, with calipers, a little less than 4 teeth of the wheel, *centre*.

For diameter of a pinion of 7 leaves, measure, with calipers, a little less than 3 teeth of the wheel, *full*.

For diameter of a pinion of 6 leaves, measure, with calipers, 3 teeth of the wheel, *centre*.

For diameter of a pinion of 5 leaves, measure, with calipers, 3 teeth of the wheel, *centre*.

As a general rule, pinions that lead, as in the hour wheel, should be somewhat larger than those that drive, and pinions of clocks should generally be somewhat larger proportionally than those of watches.

For diameter of a pinion of 4 leaves, measure, with calipers, one half of one space over 2 teeth of the wheel, *full*.

To Polish Wheels perfectly without injury.—Take a flat burnishing file, warm it over a spirit lamp, and coat it lightly with beeswax. When cold, wipe off as much of the wax as can be readily removed, and with your file thus prepared, polish the wheel, resting the wheel while polishing on a piece of cork. The finish produced will be quite equal to the finest buff polish, while there will be no clogging, and the edges of the arms and teeth will remain perfectly square.

Sandoz' Method of Producing Isochronism in Flat and Breguet Springs.—*Isochronism*, from the Greek, meaning *equal time*, is the property possessed by the pendulum and the hair spring to acomplish their arcs of vibration of different amplitudes in the same space of time. In a pendulum, the only condition required is that its length be such as to make the centre of gravity move according to the cycloid curve; but in the hair spring the means change with the forms effected by the spring. In the spherical or conical springs, the extreme curves constructed after the mathematical rules discovered by Prof. Phillipps, of the Polytechnic School of Paris, will produce an Isochronism very nearly perfect. In the flat spring, these curves cannot ex-

ist, therefore other means must be resorted to. I shall give now the results of several years of experiment and study, which can be embodied in the two following theorems:

1. *In the flat spring, every coil has theoretically a point where the vibrations are Isochronal.* 2. *That point of Isochronism is determined by the relative position of the two points connecting the hair spring with the collet and stud, called Points d'attache.*

These two propositions form the base of Isochronism in the flat spring; therefore the idea generally accredited among watchmakers that the Isochronal properties of a flat spring depend on its length is incorrect, since the 10th as well as the 20th coil of the spring is able to produce the Isochronism, the only limit being such sizes of springs that would prevent the perfect freedom of its action.

Freedom of action being necessary for the Isochronal properties of the spring to develop themselves, the spring must be bent to the centre, according to Fig. II.—the first coil being too near or the curve too flat, so that even a minute part of the spring could touch the collet, would hinder the Isochronism. Next, the spring must be pinned perfectly tight in the collet and stud, and move freely between the regulator pins.

These conditions fulfilled, the watch is run 36 or 12 hours with just strength enough to keep it going; the result is compared with a regulator and set down. Next, the watch is fully wound up, and after a space of time equal to the first trial, the result is again set down. Most generally the watch will run slower in the short vibrations than in the wide ones, and consequently lose time in the pocket in the last twelve hours of its running. Having set down as a principle that every coil has an Isochronal point, we have now to determine that point, remembering that, as a general rule, *every increase of length of the spring over that point, will cause the watch to gain in the short vibrations, and every decrease back of that point will cause it to gain in the wide vibrations.* This rule is correct only for certain limits, as I am going to explain. Supposing that a hair spring of 15 coils is perfectly Isochronal with the two *points d'attache*, just opposite each other as shown in Fig. III., the 14th and the 16th coil, as well as the 15th, will produce the Isochronism very nearly at the same point. Supposing that we increase gradually the length of that hair spring of 15 coils, pinned up so that the two *points d'attache* are primitively opposite each other—*so that its length will now be* $15\frac{1}{2}$ *coils*—the two *points d'attache* are now in the position shown in Fig. IV., or what is called pinned to the *half coil*. The result will be that the hair spring will cause the watch to gain in the short vibrations as much as it is in its power to do.

But if we go further than the half coil, we now enter the ground that belongs to the 16th coil, and every increase of length in that half coil will cause the hair spring to lose in the short vibrations, in the same proportion that it has been gaining and increasing the length of the first half. That change will continue until we reach the same point on the 16th coil that we started from on the 15th, the two pins opposite each other; at that point we shall have again the Isochronism. The same operation is applicable to the 14th coil, with the same results.

Now it is immaterial whether we take that half coil to the centre, or to the outside of the spring, because both of these operations will produce the same results, viz., the change of the relative places of the *points d'attache* of the spring. Therefore the artist has his choice, and is guided by the size of the spring and the weight of the balance; for taking half a coil to the centre of the spring will not much affect the rate of the watch, but taken outside, the difference will be great. On the other hand, a very short cut to the centre will greatly affect the Isochronism, and at the outside, a full half-coil will generally produce from 15 to 25″ difference in 24 hours. If then the watchmaker would produce the greatest possible changes of Isochronism in a watch, the change of position of the two *points d'attache* of the spring of one coil around, will give him the two highest degrees of gaining and losing in the short vibrations.

It follows from the following pages, that if a watch loses in the last running (short vibrations), the first thing to do is to increase the length of the hair spring from the outside; if the result is better, but not yet good, give still more length; if the result is worse, it shows that you are too far on the coil. Take back the whole length that you had given in the first operation, and draw more length, so as to affect the spring the other way; or if your spring is already small or your balance pretty heavy, cut to the centre so as to come around to the required positions.

Some springs cannot produce the Isochronism; this comes from a defect in making the spring, or a want of homogeneity in the metal; the only remedy is a new spring.

Fig. I.

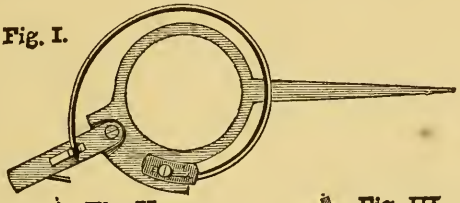


Fig. II.

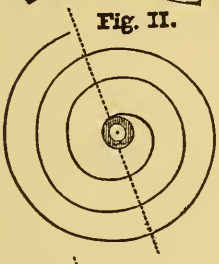


Fig. III.

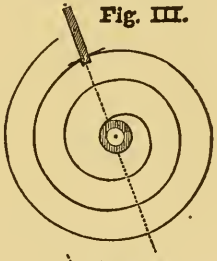


Fig. IV.

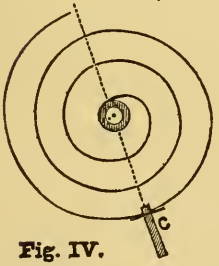
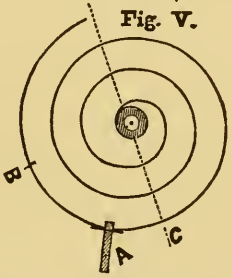


Fig. V.



In the Breguet Spring, the Isochronism is produced in the same manner as the flat springs, but great care must be taken in making the curve, for if it is not made in conformity to the principle of Phillipps, the Isochronism will be disturbed.

For instance, in Fig. V., the spring being pinned in A, and the watch losing 7″ in the last 12 hours (short vib.), I first increase the length of the hair spring to the point B; but as I am already on the ground belonging to the *losing* action, the result will be an increased loss of time in the last running. I then go back to the point A, and moreover pin the spring to C, and then I shall approximate Isochronism. However, in most cases the increase of length will make the watch gain in its last running.

Adjustments to Positions.—This adjustment is known to but few watchmakers, and they make it a regular business. It requires of the operator considerable manual skill and reflective powers. The great principle is to equalize the frictions, so that the pivots will offer to the action of the spring the same resistance in the four positions generally required, viz., dial up, XII up, cock up and III up. After having inspected and corrected the train so that the motive power is transmitted uniformly to the balance, the pivots and jewels of the lever should be polished and shortened so as to have very little friction; next, the lever should be poised as nearly perfect as possible, and the slot also in the fork where the ruby pin acts should be polished. The balance jewels ought to be made short enough to have the holes *square*, rounded inside, and perfectly polished, the balance pivots well burnished and their ends *half rounded*, and the balance poised very carefully. The English method of throwing the balance out of poise to obtain the same rate in different positions is not accepted generally, and is considered a bad practice by the most eminent watchmakers. The hair spring is put in its position without the balance, and beat so that the collet and the cock jewel will have the same centres. The watch being now in good running order, is put under trial for 12 or 24 hours, and the rate in each position carefully noted. If there is any difference in the running with the cock up, or dial up, making the ends of the pivots even and equally well polished will remove the discrepancy. If the watch *loses* with XII up, which is generally the case, and the friction on the balance jewels being reduced as much as possible, the remedy is to increase the friction when the watch is either dial or cock up. This is done by *throwing the hair spring a little out of the centre of the cock jewel*, thereby adding to the friction on the pivot end, a lateral pressure against the balance jewels. If the watch is well regulated with XII up, and loses with III up, *throw the spring a little towards the figure III;* this operation lifts up the balance when the watch is in losing position and diminishes the friction of the pivots in that particular case. Making the ends of the pivots perfectly flat has a tendency to make the watch gain with dial or cock up. The sound of the watch must be clear in all positions, else it indicates a friction, as for instance rough jewels or pivots, safety pin rubbing against the roller, etc.

How to Regulate a Watch in a few Minutes, and a Practical Method to put a new Hair Spring, of the right size and Perfectly Regulated in a Watch without Running It.—First, ascertain how many vibrations the watch beats in one minute, by counting every other vibration and comparing that time with a well-regulated watch or regulator. In general, Swiss watches beat 18,000 in one hour, viz., 300 in one minute; American watches, either 16,200, or 270 per minute; and the English levers, 14,400, or 240 per minute. If there is any doubt, it is better to count up leaves and teeth, and ascertain the right number; but these cases are scarce where watches will beat odd numbers.

Having found out the right number, examine the balance carefully for one or two minutes, counting every vibration going from *right to left*, and in the mean time examining the regulator or clock, to see when one minute is up. If the watch is well regulated, the number of vibrations must be exactly half of the regular first number, viz., 150, 135, or 120, as only every other vibration has been recorded to facilitate the observation. If not so, move the regulator, right or left, until a perfect coincidence comes.

To pick up a new hair spring, after having recorded the right number of beats—either by the old hair spring or by the numbers of the train—lay first the spring with its centre well in the centre of the cock jewel, and having ascertained where the coil will enter between the pins of the regulator, note the place. Stick to the pivot of the balance a small round piece of beeswax; then stick it to the centre of the spring, so as to establish a temporary but firm connection of the two pieces, and having pinched with the tweezers the hair spring to the place indicated by the regulator pins, cause it to vibrate gently; then count up the vibrations for one minute,

and when you have got a spring that will produce nearly the required number of beats, pin it to the collet, and cause it again to vibrate, moving the tweezers forward and backward, until the right number of beats is produced; with another pair of tweezers, pinch the hair spring about one-eighth of an inch back of the regulating point, so as to counterbalance the gain produced by the regulator pins, and bend slightly the wire, which is the place where the hair spring must be pinned to the stud. Having then trued up the spring, proceed to put the regulator to the right place, by using the way indicated in the beginning of this article, and the work is done. Success is certain, when the operation has been carefully performed. The balance must be made to vibrate on some hard and well polished substance, so as to keep up the vibration to about the standard of regular running. A little practice will soon enable the watchmaker to change a hair spring very quick, and without any trouble whatever.

Of Compensation.—A most accurate way of counterbalancing effects produced on the running of watches by different temperatures, is the expansion balance, formed of two concentric rings, one interior, of steel, and one exterior, of brass, joined together by hard soldering or smelting. The general proportion of these two metals is one part of steel, two of brass. The stronger dilation of brass, causes the rim of the balance to head inwardly when the heat, increasing, diminishes the strength of the hair spring; the greater contraction bends the rim outwardly when cold comes to increase the rigidity of the spring's coils. Pushing forward or backward the screws of the rim will affect the compensating powers of the balance, by causing their weight to be more active as they come nearer the end of the cut arm. The thinner and higher the rim, the greater the action. A few trials will bring the balance to compensate the effect of temperature from 30° to 100° Fahrenheit. For extreme temperatures another compensation, called *auxiliary*, is used, but only in ship chronometers. A soft spring will be less effected by changes of temperature than a hardened one; this affords a way to compensate certain balances, where otherwise new ones would have to be used. A precaution to observe in compensating is to make the screws go freely on the balance, and not screw them too tight, else the action of the rim not being free, a good compensation could not be attained, until the combined actions of dilation and contraction of the rim have freed the screws.

For watchmakers who would want to compensate a watch without having an expansion balance, I give the following process, which I have successfully used: After having cut off the greater part of the regulator's arm, another arm is to be fitted with a screw on the rim of the regulator, so as to revolve freely around that screw as an axis. The pins are put in the same position as on the old arm. A ring, of two parts of brass and one of steel, is then fastened to one end on that movable arm, and the other end is screwed at any convenient place, either on the regulator itself, or on the cock. See Fig. 1. By placing the whole ring on the regulator, the latter may be moved as in any other watch, the ring, opening or shutting itself under the changes of temperature, will push backward and forward the regulator pins, and so effect the compensation which is to be regulated by varying either the proportion of brass and steel, or the size of the ring.

To try the running of the watches, a common refrigerator is used to produce the low temperature, and then an apparatus, self-regulating, will produce the high temperature. It is commonly a square box of tin or copper, hermetically closed, under which is a gas burner. A compensating arm of the form of a U, made of brass and steel, is fastened inside the box, and is connected by a string with a lever attached to the key of the burner, and acts so that at the high temperature, say 100° Fahr., the gas is nearly shut off, the compensating arm gradually releasing itself and consequently letting out more gas when the heat diminishes inside the box. Use steel pins to secure spring to collet and stud.

To make Polishing Broaches.—These are usually made of ivory, and used with diamond dust, loose, instead of having been driven in. You oil the broach lightly, dip it into the finest diamond dust, and proceed to work it into the jewel the same as you do the brass broach. Unfortunately, too many watchmakers fail to attach sufficient importance to the polishing broach. The sluggish motion of watches now-a-days is more often attributable to rough jewels than to any other cause.

To Polish Steel.—Take crocus of oxide of tin and graduate it in, in the same way as in preparing diamond dust, and apply it to the steel by means of a piece of soft iron or bell metal, made proper form, and prepared with flour of emery, same as for pivot burnishers; use the coarsest of the crocus first, and finish off with the finest. To iron or soft steel a better finish may be given by burnishing, than can be imparted by the use of polishing powder of any kind whatever. *The German Method of Polishing Steel* is performed by the use of crocus on a buff wheel. Nothing can exceed the surpassing beauty imparted to steel or even cast iron by this process.

Crocus Powder for Polishing.—Chloride of sodium and sulphate of iron are well mixed in a mortar. The mixture is then put into a shallow crucible and exposed to a red heat; vapor escapes and the mass fuses. When no more vapor escapes, remove the crucible and let it cool. The color of the oxide of iron produced, if the fire has been properly regulated, is a fine violet; if the heat has been too high it becomes black. The mass when cold is to be powdered and washed, to separate the sulphate of soda. The powder of crocus is then to be submitted to a process of careful elutriation, and the finer particles reserved for the more delicate work. An excellent powder for applying to razor strops is made by igniting together in a crucible, equal parts of well dried green vitriol and common salt. The heat must be slowly raised and well regulated, otherwise the materials will boil over in a pasty state, and be lost. When well made, out of contact with air, it has the brilliant aspect of black lead. It requires to be ground and elutriated, after which it affords, on drying, an impalpable powder, that may be either applied on a strop of smooth buff leather, or mixed up with hog's lard or tallow into a stiff cerate.

To Remove Rust from Iron or Steel, &c.—For cleaning purposes, &c., kerosene oil or benzine are probably the best things known. When articles have become pitted by rust, however, these can, of course, only be removed by mechanical means, such as scouring with fine powder, or flour of emery and oil, or with very fine emery paper. To prevent steel from rusting, rub it with a mixture of lime and oil, or with mercurial ointment, either of which will be found valuable.

To Make Burnishers.—Proceed the same as in making pivot files, with the exception that you are to use fine flour of emery on a slip of oiled brass or copper, instead of the emery paper. Burnishers which have become too smooth may be improved vastly with the flour of emery as above without drawing the temper.

To Prepare a Burnisher for Polishing.—Melt a little beeswax on the face of your burnisher. Its effect then on brass or other finer metals, will be equal to the best buff. A small burnisher prepared in this way is the very thing with which to polish up watch wheels. Rest them on a piece of pith while polishing.

Rules for Determining the Correct Length of the Lever, size of Ruby-pin Table, size of the Pallets, and depth of Escapement of Lever Watches.—A lever, from the guard point to the pallet staff, should correspond in length with twice the diameter of the ruby-pin table, and when a table is accidentally lost, the correct size thereof may be known by measuring half the length of the lever between the points above named. For correct size of pallet, the clear space between the pallets should correspond with the outside measure on the points of three teeth of the escapement wheel. The only rule that can be given, without the use of diagrams,

for correct depth of the escapement, is to set it as close as it will bear, and still free itself perfectly when in motion. This may be done by first placing the escapement in your depthing tool, and then setting it to the correct depth. Then by measuring the distance between the pivots of the lever staff and escapement wheel, as now set, and the corresponding pivot holes in the watch, you determine correctly how much the depth of the escapement requires to be altered.

To prevent Watches Losing Time from Action of Pendulum Spring.—Pin the pendulum spring into the stud, so that that part, the part of the eye immediately emerging from the collet, and the centre of the collet, are in a line; then you will have the spring pinned in, in equal terms, as it is called by those who are versed in the higher branches of springing. Bring the watch to time by adding to or taking from the balance, and poise it; try the watch with the 12 up for 2 hours, then with the 6 up for 2 hours, then laying down for the same time; the trials here described will be sufficient if the watch has seconds; keep the curb pin close so as to allow the spring only a little play; the vibration of the balance should be 1¾ turn or 1½ lying.

Watch, Management of.—1. Wind your watch as nearly as possible at the same hour every day. 2. Be careful that the key is in good condition, as there is much danger of injuring the works when the key is worn or cracked; there are more main springs and chains broken through a jerk in winding than from any other cause, which injury will sooner or later be the result, if the key be in bad order. 3. As all metals contract by cold and expand by heat, it must be manifest that to keep the watch as nearly as possible at one temperature, is a necessary piece of attention. 4. Keep the watch as constantly as possible in one position, that is, if it hangs by day, let it hang by night, against something soft. 5. The hands of a pocket chronometer or duplex watch should never be set backwards; in other watches, this is a matter of no consequence. 6. The glass should never be opened in watches which set and regulate at the back. One or two directions more, it is of vital importance that you bear in mind. On regulating a watch, should it be fast, move the regulator a trifle towards the slow; and if going slow, do the reverse; you cannot move the regulator too slightly or too gently at a time, and the only inconvenience that can arise is having to perform the operation more than once. On the contrary, if you move the regulator too much at a time, you will be as far, if not farther than ever, from attaining your object, so that you may repeat the movement until quite tired and disappointed, stoutly blaming both watch and watchmaker, while the fault is entirely your own. Again, you cannot be too careful in respect of the nature and condition of your watch-pocket; see that it be made of something soft and pliant, such as wash-leather, which is the best, and also that there be no flue or nap that may be torn off when taking the watch out of the pocket. Cleanliness, too, is as needful here as in the key before winding; for, if there be dust or dirt in either instance, it will, you may rely upon it, work its way into the watch, as well as wear away the engine-turning of the case.

To Put Watches in Beat.—If a cylinder escapement, or a detached lever, put the balance into a position, then turn the regulator so that it will point directly to the pivot-hole of the pallet staff, if a lever, or of the scape-wheel, if a cylinder. Then lift out the balance with its bridge or clock, turn it over and set the ruby-pin directly in line with the regulator, or the square cut of the cylinder at right angles with it. Your watch will then be in perfect beat. In case of an American or an English lever, when the regulator is placed upon the plate, you will have to proceed differently. Fix the balance into its place, cut off the connection of the train, if the mainspring is not entirely down, by slipping a fine broach into one of the wheels, look between the plates and ascertain how the lever stands. If the end farthest from the balance is equi-distant between the two brass pins, it is all right; if not, change the hair-spring till it becomes so. If dealing

with a duplex watch, you must see that the roller notch, when the balance is at rest, is exactly between the locking tooth and the line of centre; that is, a line drawn from the centre of the roller to the centre of the scape-wheel. The balance must start from its rest and move through an arc of about ten degrees before bringing the locking tooth into action.

To Frost Watch Plates.—Watch plates are frosted by means of fine brass wire scratch brushes fixed in a lathe, and made to revolve at great speed, the end of the wire brushes striking the plate producing a beautiful frosted appearance.

To Restore Watch Dials.—If the dial be painted, clean the figure off with spirits of wine, or anything else that will render the dial perfectly clean; then heat it to a bright red, and plunge it into a strong solution of cyanide of potassium, then wash in soap and water and dry in box dust. Repeat if not a good color. India ink, ground with gum water, will do for the figures.

To Whiten Silver Watch Dials.—Flatten a piece of charcoal by rubbing it on a flat stone; on this place the dial face upwards, apply a gentle heat carefully with the blow-pipe, allowing the flame to play all over the surface of the dial without touching it, so as to thoroughly heat without warping the dial. Then pickle and rinse, using acid enough to make the water very tart, and immersing but for a few seconds. Silver dials may also be annealed by heating them red hot on a flat piece of copper over a clear fire.

To Make a Watch Keep Good Time when the Cylinder Edges are Worn off, by Altering the Escapement without Putting a new Cylinder in.—Look at the cylinder, and see if there is room, either above or below the old wears, to shift the action of the wheel. If the wheel holes are brass, making one a little deeper, and putting a shallower one on the other side, will perhaps be sufficient. This must be done according as you want your wheel up or down. If the holes are stone, shift your wheel on the pinion by a new collet, or turning away more of the old one, as the case may require. If you raise your wheel see that it works free of plate and top of cylinder, and that the web of the wheel clears the top of passage. This last fault may be altered by polishing the passage a little wider, if the rub be slight. If shifted downwards, see to freedom at bottom of cylinder, &c.

Polishing Watch Balance.—This may be done with sufficient accuracy by scraping one arm of the calipers with a file when the balance is set in motion. This will cause the heaviest part to settle downwards with certainty, observing always that the pivots are nicely rounded and formed at the ends. In some cases it becomes necessary to put a balance out of poise, in order to make the watch go equally in various positions. The rule for this is: to make the watch gain, the balance should be heaviest on the lower side when hanging up: to make it lose the reverse.

To Prevent a Chain Running off the Fusee.—In the first place, you must look and ascertain the cause of the difficulty. If it results from the chain being too large, the only remedy is a new chain. If it is not too large, and yet runs off without any apparent cause, change it end for end—that will generally make it go all right. In cases where the channel in the fusee has been damaged and is rough, you will be under the necessity of dressing it over with a file the proper size and shape. Sometimes you find the chain naturally inclined to work away from the body of the fusee. The best way to remedy a difficulty of this kind is to file off a very little from the outer lower edge of the chain the entire length; this, as you can see, will incline it to work on instead of off. Some workmen, when they have a bad case and a common watch, change the standing of the fusee so as to cause the winding end of its arbor to incline a little from the barrel. This, of course, cannot do otherwise than make the chain run to its place.

To Weaken the Hair-Spring.—This is often effected by grinding the spring down. You remove the spring from the collet, and place it upon

a piece of pivot wood cut to fit the centre coil. A piece of soft steel wire, flattened so as to pass freely between the coils, and armed with a little pulverized oil-stone and oil, will serve as your grinder, and with it you may soon reduce the strength of the spring. Your operations will, of course, be confined to the centre coil, for no other part of the spring will rest sufficiently against the wood to enable you to grind it, but this will generally suffice. The effect will be more rapid than one would suppose, therefore it will stand you in hand to be careful, or you may get the spring too weak before you suspect it.

To Tighten a Ruby Pin.—Set the ruby pin in asphaltum varnish. It will become hard in a few minutes, and be much firmer and better than gum shellac, as generally used.

To Temper Brass, or to Draw its Temper.—Brass is rendered hard by hammering or rolling; therefore, when you make a thing of brass necessary to be in temper, you must prepare the material before shaping the article. Temper may be drawn from brass by heating it to a cherry red, and then simply plunging it into water, the same as though you were going to temper steel.

To Temper Gravers.—Gravers and other instruments larger than drills, may be tempered in quicksilver as above; or you may use lead instead of quicksilver. Cut down into the lead, say half an inch; then having heated your instrument to a light cherry red, press it firmly into the cut. The lead will melt around it, and an excellent temper will be imparted.

To Temper Drills.—Select none but the finest and best steel for your drills. In making them, never heat higher than a cherry red, and always hammer till nearly cold. Do all your hammering in one way, for if, after you have flattened your piece out, you attempt to hammer it back to a square or a round, you spoil it. When your drill is in proper shape, heat it to a cherry red, and thrust it into a piece of resin or into quicksilver. Some use a solution of cyanuret potassa and rain-water for tempering their drills, but the resin or quicksilver will work best.

Other Methods to Temper Springs.—Having fitted the spring into the case according to your liking, temper it hard by heating and plunging into water. Next polish the small end so that you may be able to see when the color changes; lay it on a piece of copper or brass plate, and hold it over your lamp, with the blaze directly under the largest part of the spring. Watch the polished part of the steel closely, and when you see it turn blue, remove the plate from the lamp, letting all cool gradually together. When cool enough to handle, polish the end of the spring again, place it on the plate, and hold it over the lamp as before. The third blueing of the polished end will leave the spring in proper temper. Any steel article to which you desire to give a spring temper may be treated in the same way. Another process, said to be good, is to temper the spring as in the first instance; then put it into a small iron ladle, cover it with linseed oil, and hold over a lamp till the oil takes fire. Remove the ladle, but let the oil continue to burn until nearly all consumed, then blow out, re-cover with oil, and hold over the lamp as before. The third burning out of the oil will leave the spring in the right temper.

To Temper Clicks, Ratchets, &c.—Clicks, ratchets, or other steel articles requiring a similar degree of hardness, should be tempered in mercurial ointment. The process consists in simply heating to a cherry red and plunging into the ointment. No other mode will combine toughness and hardness to such an extent.

You will understand the reason for having the article thus plugged up while passing it through the heating and cooling process, when you know that springing always results from the action of changeable currents of atmosphere. The temper may be drawn from cylinders, staffs, pinions, or any other delicate pieces, by this mode with perfect safety.

To Temper Staffs, Cylinders, or Pinions, without Springing them.—Prepare the articles as in the preceding process, using a steel plug

Having heated the key-pipe to a cherry red, plunge it into water; then polish the end of your steel plug, place the key upon a plate of brass or copper, and hold it over your lamp with the blaze immediately under the pipe till the polished part becomes blue. Let cool gradually, then polish again. Blue and cool a second time, and the work will be done.

To Draw the Temper from part of a Small Steel Article.—Hold the part from which you wish to draw the temper with a pair of tweezers, and with your blow-pipe direct the flame upon them—not the article—till sufficient heat is communicated to the article to produce the desired effect.

To Blue Screws Evenly.—Take an old watch barrel and drill as many holes into the head of it as you desire to blue screws at a time. Fill it about one-fourth full of brass or iron filings, put in the head, and then fit a wire, long enough to bend over for a handle, into the arbor holes—head of the barrel upwards. Brighten the heads of your screws, set them point downwards, into the holes already drilled, and expose the bottom of the barrel to your lamp till the screws assume the color you wish.

To Remove Blueing from Steel.—Immerse in a pickle composed of equal parts muriatic acid and elixir vitriol. Rinse in pure water, and dry in tissue paper.

To Make Diamond Broaches.—Make your broaches of brass the size and shape you desire; then having oiled them slightly, roll their points into fine diamond dust until entirely covered. Hold them then on the face of your anvil and tap with a light hammer till the grains disappear in the brass. Great caution will be necessary in this operation. Do not tap heavy enough to flatten the broach. Very light blows are all that will be required; the grains will be driven in much sooner than one would imagine. Some roll the broach between two small pieces of steel to imbed the diamond dust. It is a very good way, but somewhat more wasteful of the dust. Broaches made on this plan are used for dressing out jewels.

Jewelling.—In using the broaches, press but lightly into the jewel hole, and turn the broach rapidly with your fingers. For polishing, use a bone or ivory point, lightly coated with the finest diamond dust and oil, and while using it with the one hand, accompany the motion with a slight oscillating motion of the other hand, in which the jewel is held. This will insure a more even polish of the hole, with less liability to press the jewel out of its place in the plate, than if held firm and steady.

To Make Diamond Files.—Shape your file of brass, and charge with diamond dust, as in case of the mill. Grade the dust in accordance with the coarse or fine character of the file desired.

To Make a Diamond Mill.—Make a brass chuck or wheel, suitable for use on a foot-lathe, with a flat even surface, or face of about 1½ or 2 inches in diameter; then place a number of the coarsest pieces of your diamond dust on different parts of its face, and with a smooth-faced steel hammer drive the pieces of dust all evenly into the brass to nearly or quite level with the surface. Your mill, thus prepared, is now used for making pallet jewels or for grinding stone and glass of any kind. For polishing, use a bone or box-wood chuck or wheel, of similar form to your mill, and coat it slightly with the finest grade of diamond-dust and oil; with this a beautiful polish may be given to the hardest stone.

To Make Diamond Dust.—Place a few small pieces of common or cheap diamond on a block of hard polished steel, in a suitable vessel and cover it with water to prevent it flying or scattering, then place a flat steel punch on each piece separately, and strike the punch with a mallet or hammer, with sufficient force to crush the diamond. When reduced sufficiently fine in this way, the dust may be collected and dried for use; after drying, it may be graduated for different purposes, by mixing it with a little watch oil; when agitated, the finest particles will float near the surface, whilst the coarsest pieces will sink at once to the bottom; and thus by decanting the oil in which the dust floats, as many grades of fineness as desired

may be obtained. The dust may be separated from the oil by pouring on a piece of smooth clean paper; the paper will absorb the oil, or allow it to filter through, while the dust will remain on the surface; but to prevent waste, the better way is to leave it in the oil and use directly therefrom as required, or the oil may be washed out of the dust with alcohol.

To Preserve Pinions or Bearings from Corrosion and Rust.—In case of the lower centre bearing under the cannon pinion corroding or rusting, when you clean the watch be particular to take the centre wheel off. Clean it thoroughly; if the pivot is scratched polish it, then make a little hollow in the top hole; put good fresh oil on it, and the pivot will not corrode or rust for two or three years. As to the other pivots in the watch, they should all be thoroughly cleaned, and old oil cleaned out: then if no dust gets in, and no accident happens to the watch, it will run for years.

To Bush.—The hole through which the great arbors, or winding axles, work, are the only ones that usually require bushing. When they have become too much worn, the great wheel on the axle before named strikes too deeply into the pinions above it and stops the clock. To remedy this, bushing is necessary, of course. The most common way of doing is to drive a steel point or punch into the plate just above the axle hole, thus forcing the brass downwards until the hole is reduced to its original size. Another mode is to solder a piece of brass upon the plate in such a position as to hold the axle down to its proper place. If you simply wish your clock to run, and have no ambition to produce a bush that will look workmanlike, about as good a way as any is to fit a piece of hard wood between the post which comes through the top of the plate and axle. Make it long enough to hold the axle to its proper place, so that the axle will run on the end of the grain. Cut notches where the pivots come through, and secure by wrapping around it and the plate a piece of small wire or a thread.

To Remedy Worn Pinions.—Turn the leaves or rollers, so the worn places upon them will be towards the arbor or shaft, and fasten them in that position. If they are "rolling pinions" and you cannot secure them otherwise, you had better do it with a little soft solder.

To Oil Properly.—Oil only, and very lightly, the pallets of the verge, the steel pin upon which the verge works, and the point where the loop of the verge wire works over the pendulum wire. Use none but the best watch oil. Though you might be working constantly at the clock-repairing business, a bottle costing you but twenty-five cents would last you two years at least. You can buy it at any watch-furnishing establishment.

To Make the Clock Strike Correctly.—If not very cautious in putting up your clock you will get some of your striking-train wheels in wrong, and thus produce a derangement in the striking. If this should happen, pry the plates apart on the striking side, slip the pivots of the upper wheels out, and having disconnected them from the train, turn them part around and put them back. If still not right, repeat the experiment. A few efforts at most will get them to working properly. The sound in cuckoo clocks is caused by a wire acting on a small bellows which is connected with two small pipes like organ pipes.

A Defect to Look after.—Always examine the pendulum wire at the point where the loop of the verge wire works over it. You will generally find a small notch, or at least a rough place worn there. Dress it out perfectly smooth, or your clock will not be likely to work well. Small as this defect may seem, it stops a large number of clocks.

Figures on Gold and Silver Dials.—Hold a small piece of copper over a gas flame for a few minutes till it is coated with soot; clear this off on to a piece of finely ground glass, add fat oil and a small quantity of oil of spike lavender, and grind up; paint with a small camel hair brush.

To Re-Black Clock Hands.—Use asphaltum varnish. One coat will make old rusty hands look as good as new, and it dries in a few minutes.

LIST OF TRAINS OF WATCHES.

SHOWING THE NUMBER OF TEETH IN THE WHEELS, LEAVES IN THE PINIONS BEATS IN A MINUTE, AND TIME THE FOURTH WHEEL REVOLVES IN.

Trains, for Seven Teeth in the Escapement Wheel.

No. of Teeth in the Centre Wheel.	Teeth in 3d Wheel.	Leaves in 3d Wheel Pinion.	Teeth in 4th Wheel	Leaves in 4th Wheel Pinion.	Teeth in the Escapement Wheel.	Leaves in the Escapement Wheel Pinion.	No. of Beats in one minute.	No. of Seconds the 4th Wheel revolves in.
72	66	6	58	6	7	6	298—	27
66	64	6	64	6	7	6	292+	31
66	64	6	63	6	7	6	287+	31
66	63	6	63	6	7	6	283—	31
66	63	6	62	6	7	6	278+	31
66	63	6	61	6	7	6	274—	31
66	63	6	60	6	7	6	269+	31

Trains, for Nine Teeth in the Escapement Wheel.

63	60	6	57	6	9	6	299+	34
66	60	6	54	6	9	6	297	33
63	60	6	56	6	9	6	294	34
66	60	6	53	6	9	6	291+	33
63	60	6	55	6	9	6	289—	34
66	60	6	52	6	9	6	286	33
63	60	6	54	6	9	6	283+	34
66	60	6	51	6	9	6	280+	33
63	60	6	53	6	9	6	278+	34
66	60	6	50	6	9	6	275	33
63	60	6	52	6	9	6	273	34

Trains, for Eleven Teeth in the Escapement Wheel.

60	60	6	49	6	11	6	300—	36
60	54	6	54	6	11	6	297	40
60	56	6	52	6	11	6	230—	30
64	52	6	52	6	11	6	294—	30
58	56	6	53	6	11	6	292+	40
60	54	6	53	6	11	6	291+	40
62	54	6	51	6	11	6	290—	39
58	54	6	54	6	11	6	287+	41
58	55	6	53	6	11	6	287	41
59	54	6	53	6	11	6	286+	41
60	54	6	52	6	11	6	286	40
60	55	6	51	6	11	6	286—	39
61	55	6	50	6	11	6	285—	39
63	55	6	48	6	11	6	282+	38
59	54	6	52	6	11	6	281+	41
60	54	6	51	6	11	6	281+	40
61	54	6	50	6	11	6	280—	39
56	54	6	54	6	11	6	277+	43
60	60	6	48	6	11	6	293+	36
62	54	6	52	6	11	6	295+	39
63	54	6	50	6	11	6	289—	38
63	48	6	56	6	11	6	287+	43
70	70	7	56	7	11	7	293+	36
70	70	7	48	7	11	6	293+	36
70	60	7	48	6	11	6	293+	36

To Tin Copper Stew Dishes, &c.—Wash the surface of the article to be tinned with sulphuric acid, and rub the surface well, so as to have it smooth and free of blackness caused by the acid; then sprinkle calcined and finely pulverized sal-ammoniac upon the surface, holding it over a fire, when it will be sufficiently hot to melt a bar of solder which is to be rubbed over the surface. Any copper dish or vessel may be tinned in this way.

No. of Teeth in the Centre Wheel.	Teeth in 3d Wheel.	Leaves in 3d Wheel Pinion.	Teeth in 4th Wheel	Leaves in 4th Wheel Pinion.	Teeth in the Escapement Wheel.	Leaves in the Escapement Wheel Pinion.	No. of Beats in one Minute.	No. of Seconds the 4th Wheel revolves
60	70	6	48	7	11	6	293+	
63	50	6	56	7	11	6	287+	
63	63	6	50	7	11	6	289—	
80	80	8	64	8	11	8	293+	
80	80	8	56	8	11	7	293+	
80	80	8	48	8	11	6	293+	
80	70	8	56	7	11	7	293+	
80	70	8	48	7	11	6	293+	
80	60	8	48	6	11	6	293+	
70	80	7	56	8	11	7	293+	
70	80	7	48	8	11	6	293+	
60	80	6	48	8	11	6	293+	
84	72	8	50	8	11	6	289—	38
84	63	8	50	7	11	6	289—	38
84	54	8	50	6	11	6	289—	38
63	72	6	50	8	11	6	289—	38
63	63	6	50	7	11	6	289—	38
84	64	8	56	8	11	6	287+	40
84	56	8	56	7	11	6	287+	40
84	48	8	56	6	11	6	287+	40
63	64	6	56	8	11	6	287+	40
63	56	6	56	7	11	6	287+	40

Trains, for Thirteen Teeth in the Escapement Wheel.

54	53	6	52	6	13	6	298+	45
56	53	6	50	6	13	6	298—	44
59	51	6	49	6	13	6	296—	43
60	51	6	48	6	13	6	294+	42
54	53	6	51	6	13	6	293—	45
56	53	6	49	6	13	6	292—	44
56	54	6	48	6	13	6	291+	44
57	53	6	48	6	13	6	291—	43
54	52	6	51	6	13	6	287+	46
54	43	6	50	6	13	6	287+	45
50	51	6	50	6	13	6	286+	45
54	52	6	50	6	13	6	282—	46
56	51	6	49	6	13	6	281—	45
57	51	6	48	6	13	6	280—	44
52	52	6	51	6	13	6	277—	48
53	52	6	50	6	13	6	276+	46
52	52	6	52	6	13	6	293—	46
55	51	6	51	6	13	6	287	46
56	50	6	51	6	13	6	286+	46
56	52	6	48	6	13	6	280+	44
56	52	6	50	6	13	6	292+	44
60	48	6	48	6	13	6	277+	45
60	50	6	48	6	13	6	289—	43
60	54	6	60	8	12	6	292+	53
60	58	7	56	7	13	6	287+	51
60	60	8	54	6	13	6	300	44
62	56	7	56	7	13	6	296+	47
63	52	7	51	6	13	6	285	60
63	60	7	60	7	13	6	290	60
64	60	7	60	7	13	6	285	60
72	70	8	68	8	13	6	280	60
74	68	8	68	8	13	6	286+	60

To Draw the Temper from Delicate Steel Pieces without Springing them.—Place the articles from which you desire to draw the temper in a common iron clock key. Fill around it with brass or iron filings, and then plug up the open end with a steel, iron, or brass plug, made to fit closely. Take the handle of the key with your pliers and hold its pipe into the blaze of a lamp till near hot, then let it cool gradually. When sufficiently cold to handle, remove the plug, and you will find the article with its temper fully drawn, but in all other respects just as it was before.

Trains, for Fifteen Teeth in the Escapement Wheel.

No. of Teeth in the Centre Wheel.	Teeth in 3d Wheel.	Leaves in 3d Wheel Pinion.	Teeth in 4th Wheel	Leaves in 4th Wheel Pinion.	Teeth in the Escapement Wheel.	Leaves in the Escapement Wheel Pinion.	No. of Beats in one Minute.	No. of Seconds the 4th Wheel revolves in.
54	50	6	48	6	15	6	286	48
58	48	6	46	6	15	6	290	50
48	45	6	59	6	15	6	291—	60
48	45	6	58	6	15	6	300	62
48	45	6	57	6	15	6	288	62
48	45	6	56	6	15	6	288	50
56	48	6	46	6	15	6	289—	50
63	56	7	56	7	15	7	288	50
60	56	8	58	7	15	6	288	50
62	60	8	60	8	15	6	288	50
72	64	8	50	8	15	6	288	50
72	64	8	56	8	15	7	288	50
72	64	8	64	8	15	8	288	50
52	50	6	48	6	15	6	288	50
54	48	6	48	6	15	6	288	50
72	64	8	48	8	16	6	288	50
72	80	8	64	10	15	8	288	50
72	80	8	56	10	15	7	288	50
72	80	8	48	10	15	6	288	50
63	80	7	64	10	15	8	288	50
63	80	7	56	10	15	7	288	50
63	80	7	48	10	15	6	288	50

Trains, for Seventeen Teeth in the Escapement Wheel.

64	80	8	48	10	17	6	299+	53
54	48	6	44	6	17	6	299+	50
51	48	6	45	6	17	6	295+	53
54	48	6	43	6	17	6	292+	50
48	48	6	48	6	17	6	290+	53
51	48	6	45	6	17	6	289	53
54	48	6	42	6	17	6	286—	53
48	48	6	47	6	17	6	284+	53
51	48	6	44	6	17	6	283—	53
48	48	6	46	6	17	6	278	53
48	48	6	45	6	17	6	272	53
64	64	8	64	8	17	8	290+	50
72	64	8	56	8	17	8	286—	50
64	64	8	60	8	17	8	289—	53
56	56	7	56	7	17	7	290+	53
63	56	7	49	7	17	7	286—	50
64	56	8	48	7	17	6	290+	53
80	80	10	64	10	17	8	290+	53
80	64	10	64	8	17	8	290+	53
80	64	10	56	8	17	7	290+	53
80	64	10	48	8	17	6	290+	53
80	56	10	56	7	17	7	290+	53
80	56	10	48	7	17	6	290+	53
64	80	8	64	10	17	8	290+	53
64	80	8	56	10	17	7	290+	53

To Remove Soft Solder from Gold.—Place the work in spirits of salts, or remove as much as possible with the scraper, using a gentle heat to enable you to get off the solder more easily. Very useful to be known where hard soldering is required, either in bright or colored work.

Valuable Recipe for Goldsmiths.—Standard gold is compounded of 440 grains of fine gold, and 40 grains (Troy weight) to the oz. alloy; therefore, when you judge how much gold a piece of work will take, compound it to the standard weight by the following directions: *Assay Weight.*—The weight of gold is a pound, which is divided into 12 ozs., each oz. into 24 carats, each carat into 4 grains, and, lastly, each grain into 4 quarters; then you see the assay quarter-grain, is in reality 1¼ grain Troy.

Trains, for Third Wheel and Patent Seconds.

No. of Teeth in the Centre Wheel	Teeth in 3d Wheel.	Leaves in 3d Wheel Pinion.	Teeth in 4th Wheel	Leaves in 4th Wheel Pinion.	Teeth in the Escapement Wheel.	Leaves in the Escapement Wheel Pinion.	No. of Beats in one Minute.	No. of Second the 4th Wheel revolves in.
60	72	6	60	12	..	6	300	60
60	60	6	60	10	..	6	300	60
60	48	6	60	8	..	6	3 0	60
48	60	6	60	8	..	6	300	60
60	72	6	54	12	..	6	270	60
60	60	6	54	10	..	6	270	60
48	60	6	54	8	..	6	270	60
60	72	6	48	12	..	6	240	60
60	60	6	48	10	.	6	240	60
48	60	6	48	8		6	240	60

Trains, for Fourth Wheel Seconds, with Eleven Teeth in the Escapement Wheel.

48	45	6	71	6	11	6	260+	60
48	45	6	74	6	11	6	271+	60
48	45	6	76	6	11	6	279—	60
48	45	6	78	6	11	6	286	60
60	49	7	74	7	11	6	271+	60
60	49	7	76	7	11	6	279—	60
60	49	7	78	7	11	6	286	60
45	56	6	74	7	11	6	271+	60
45	56	6	76	7	11	6	279—	60
45	56	6	78	7	11	6	286	60
64	60	8	74	8	11	6	271+	60
64	60	8	76	8	11	5	279—	60
64	60	8	78	8	11	6	286	60
60	56	8	74	7	11	6	271+	60
60	56	8	76	7	11	6	279—	60
60	56	8	78	7	11	6	286	60
60	48	8	74	6	11	6	271+	60
48	48	8	78	6	11	6	286	60
48	60	6	74	8	11	6	271+	60
48	60	6	78	8	11	6	286	60
56	60	7	74	8	11	6	271+	60

Trains, for Fourth Wheel Seconds, with Thirteen Teeth in the Escapement Wheel.

64	60	8	66	8	13	6	286	60
64	60	8	67	8	13	6	290+	60
64	60	8	68	8	13	6	295—	60
64	60	8	69	8	13	6	299	60
60	49	7	77	7	13	7	286	60
60	49	7	66	7	12	6	286	60
60	49	7	67	7	13	6	290+	60
48	45	6	66	6	13	6	286	60
48	45	6	67	6	13	6	290+	60
48	45	6	68	6	13	6	264—	60
48	45	6	69	6	13	6	299	60
60	56	8	66	7	13	6	286	60
80	60	10	66	8	13	6	286	60
64	75	8	66	10	13	6	286	60
48	60	6	66	8	13	6	286	60
48	75	6	66	10	13	6	286	60
45	56	6	66	7	13	6	286	60
56	75	7	68	10	13	6	295—	60

To Make Pivot Files.—Dress up a piece of wood file-fashion, about an inch broad, and glue a piece of fine emery paper upon it. Shape your file then, as you wish it, of the best cast steel, and before tempering pass your emery paper heavily across it several times, diagonally. Temper by heating to a cherry red, and plunging into linseed oil. Old worn pivot files may be dressed over and made new by this process. At first thought, one would be led to regard them too slightly cut to work well, but not so. They dress a pivot more rapidly than any other file.

Trains, for Fourth Wheel Seconds, with Fifteen Teeth in Escapement Wheel.

No. of Teeth in the Centre Wheel.	Teeth in 3d Wheel.	Leaves in 3d Wheel Pinion.	Teeth in 4th Wheel	Leaves in 4th Wheel Pinion.	Teeth in the Escapement Wheel.	Leaves the Escapement Wheel Pinion.	No. of Beats in one Minute.	No. of Seconds the 4th Wheel revolves in.
64	6	8	70	8	15	7	300	60
64	60	8	60	8	15	6	300	60
64	45	8	60	6	15	6	300	60
60	56	8	60	7	15	6	300	60
48	60	6	60	8	15	6	300	60
60	70	7	70	7	15	7	300	60
60	49	7	60	7	15	6	300	60
48	49	6	60	6	15	6	300	60
80	45	10	70	8	15	7	300	60
75	60	10	60	8	15	6	300	60
64	64	8	70	10	15	7	3 0	60
64	75	8	60	10	15	6	300	60
56	75	7	70	10	15	7	3 0	60
56	75	7	60	10	15	6	300	60
64	75	8	54	8	15	6	270	60
60	60	8	54	7	15	6	270	60
64	56	8	54	6	15	6	270	60
48	45	6	54	8	15	6	270	60
60	60	7	63	7	15	7	270	60
60	49	7	54	7	15	6	270	60
48	49	6	54	6	15	6	270	60
64	45	8	48	8	15	6	240	60
60	60	8	48	7	15	6	240	60
48	50	6	48	8	15	6	240	60
64	60	8	48	8	15	6	240	60
60	45	7	56	7	15	7	240	60
60	49	7	48	7	15	6	240	60
48	45	6	48	6	15	6	240	60
60	56	8	48	7	15	6	240	60

Trains, for Fourth Wheel Seconds, with Seventeen Teeth in Escapement Wheel.

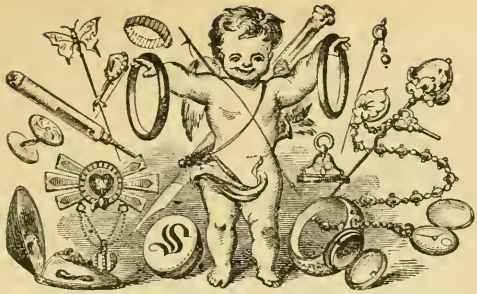
64	60	8	51	8	17	6	289	60
64	60	8	50	8	17	6	283+	50
60	56	8	51	7	17	6	289	60
80	60	10	50	8	17	6	283+	60
75	64	10	50	8	17	6	283+	60
75	56	10	68	7	17	8	289	60
75	68	10	68	8	17	8	289	60
80	75	10	68	10	17	8	289	60

Train of the American Watch Company's Watch.

64	60	8	64	8	15	7	300	60

NOTE.—By use of the foregoing set of Trains, and the rule for sizes of pinions, on page 183, all difficulty of calculating is obviated; and at one view, in case of the accidental loss of a wheel and pinion, may be known the correct size and count of the pinion, and number of teeth in the wheel lost.

TO CLEAN A CLOCK.—Take the movement of the clock to "pieces. Brush the wheels and pinions thoroughly with a stiff coarse brush; also the plates which the trains work. Clean the pivots well by turning in a piece of cotton cloth held tightly between your thumb and finger. The pivot holes in the plates are generally cleansed by turning a piece of wood into them, but I have always found a strip of cloth or a soft cord drawn tightly through them to act the best. If you use two cords, the first one slightly oiled, and the next dry, to clean the oil out, all the better. Do not use salt or acid to clean your clock—it can do no good, but may do a great deal of harm. Boiling the movement in water, as is the practice of some, is also foolishness.



JEWELLERS, GOLD AND SILVERSMITHS.

VALUABLE RECEIPTS, MANUFACTURING, SMELTING AND REFINING, FINENESS OF GOLD, ARTIFICIAL GOLD, THE COINS OF THE UNITED STATES, THE STANDARD FOR GOLD AND SILVER COINS, ALLOYS, &C.

QUANTITY OF STANDARD GOLD TO COMPOUND AN OZ. OF ANY OF THE FOLLOWING ALLOYS CALCULATED TO THE ¼ OF A GRAIN, AS FOLLOWS :

Carat.	Dwts.	Grs.	Qrs.		Dwts.	Grs.	Qrs
1	0	21	9		19	2	2
2	1	19	7		18	4	4
3	2	17	5		17	6	6
4	3	15	3		16	8	8
5	4	13	1		15	10	10
6	5	10	10		14	13	1
7	6	8	8		13	15	3
8	7	6	6		12	17	5
9	8	4	4		11	19	7
10	9	2	2		10	21	9
11	10	0	0		10	0	0
12	10	21	9		9	2	2
13	11	19	7		8	4	4
14	12	17	5		7	6	6
15	13	15	3		6	8	8
16	14	13	1		5	10	10
17	15	10	10		4	13	1
18	16	8	8		3	15	3
19	17	6	6		2	17	5
20	18	4	4		1	19	7
21	19	2	2		0	21	9
22	22	0	0				

ALLOY TO BE ADDED.

GOLD ALLOYS.—The "New Standard" for watch cases, &c., is 18 carats of fine gold and 6 of alloy. No gold of inferior quality can receive the "Hall mark;" and gold of lower quality is generally described by its commercial value. The alloy may be entirely silver, which will give a green color, or entirely copper for a red color, but the copper and silver are more usually mixed in one alloy according to the taste of the jeweller. It will be understood that these are all made with fine gold, fine silver, and fine

copper, direct from the refiner. Gold of 22 carats fine, being so little used, is intentionally omitted. 1. *Gold of* 18 *carats, of yellow tint.* Gold, 15 dwt., silver, 2 dwt. 18 grs., copper, 2 dwt. 6 grs. 2. *Gold of* 18 *carats, red tint.* Gold, 15 dwt., silver, 1 dwt. 18 grs., copper, 3 dwt. 6 grs. 3. *Spring gold of* 16 *carats.* Gold, 1 oz. 16 dwt., silver, 6 dwt., copper, 12 dwt. This when drawn or rolled very hard makes springs little inferior to steel. 4. *Jewellers' Fine Gold, yellow tint,* 16 *carats nearly.* Gold, 1 oz., silver, 7 dwt., copper, 5 dwt. 5. *Gold of red tint,* 16 *carats.* Gold 1 oz., silver, 2 dwt., copper, 8 dwt.

New and Beautiful Alloys.—Copper, 69.8 parts; nickel, 19.8 parts; zinc, 5.5 parts; cadmium, 4.7 parts; used for spoons, forks, &c. *Another,* —Copper, 89.3 parts; aluminum, 10.5 parts. *Oreide resembling Gold.* Copper, 79.7 parts; zinc, 83.05 parts; nickel, 6.09 parts, with a trace of iron and tin.

Sterling Gold Alloy, 78s. per oz.—1. Fine gold, 18 dwts., 12 grs., fine silver, 1 dwt., fine copper, 12 grs.—2. *Dry colored Gold Alloys,* 17 *Carat.* Fine gold, 15 dwts., fine silver, 1 dwt. 10 grs., fine copper, 4 dwts. 17 grs., —3. *Another,* 18 *Carat.* Fine gold, 1 oz., fine silver, 4 dwts. 10 grs., fine copper, 2 dwts. 5 grs.—4. *Another,* 18 *Carat.* Fine gold, 15 dwts., fine silver, 2 dwts. 4 grs., fine copper, 2 dwts. 19 grs.—5. *Another* 18 *Carat.* Fine gold, 18 dwts., fine silver, 2 dwts. 18 grs., fine copper, 3 dwts. 18 grs.—6. *Another,* 19 *Carat.* Fine gold, 1 oz., fine silver, 2 dwts. 6 grs., fine copper, 3 dwts. 12 grs.—7. *Another,* 20 *Carat.* Fine gold, 1 oz., fine silver, 2 dwts., fine copper, 2 dwts. 4 grs.—8. *Another,* 22 *Carat.* Fine gold, 18 dwts., fine silver, 12 grs., fine copper, 1 dwt. 3 grs.—9. *Gold solder for the foregoing Alloys.* Take of the alloyed gold you are using, 1 dwt., fine silver, 6 grs.—10. *Alloy for Dry Colored Rings.* Fine gold, 1 oz., fine silver, 4 dwts. 6 grs., fine copper, 4 dwts. 6 grs.—11. *Solder for ditto.* Scrap gold, 2 ozs., fine silver, 3 dwts., fine copper, 3 dwts.—12. *Dry Colored Scrap reduced to* 35s. *Gold.* Colored scrap, 1 oz., 9 dwts. 12 grs., fine silver, 2 dwts., fine copper, 17 dwts., 12 grs., spelter, 4 dwts.

Dry Coloring for the Foregoing.—Polish your work well and for every 2 ozs. take saltpetre, 8 ozs., alum, 4 ozs., salt, 4 ozs., melt all together in a black lead pot, stirring with a thin iron bar when dissolving. Use the fire on a forge and urge it well with the bellows, as you cannot make it too hot. Your polished work being well cleaned with soda, soap, and hot water, is dried in box sawdust, is afterwards covered with a thin layer of borax, annealed and boiled out, and again dried in box sawdust, and finally hung on platinum or silver wire. When the "color" in the pot assumes a brown yellow flame, the work is dipped in for two or three seconds, and quenched with hot water diluted with muriatic acid, which removes any "color" that may adhere to the work. This ought to produce the desired color, but if it does not, repeat the process, previously drying the work before re-immersion in the "color." The color-pot must be emptied immediately upon the forge, so that it may be ready for future use.

Wet Colored Alloys.—1. Fine gold, 1 oz., fine silver, 3 dwts. 12 grs., fine copper, 9 dwts. 2. Fine gold, 1 oz., fine silver, 4 dwts. 12 grs., fine copper, 10 dwts. 3. Fine gold, 1 oz., fine silver, 4 dwts. 12 grs., fine copper, 10 dwts. 12 grs. 4. Fine gold, 1 oz., fine silver, 4 dwts., fine copper, 9 dwts. 12 grs. 5. *Green Gold for Fancy Work.* Fine gold, 1 oz., fine silver, 6 dwts. 16 grs. 6. *Another Green Gold.* Fine gold, 10 dwts., fine silver, 2 dwts. 2 grs. 7. *Red Gold for Fancy Work.* Fine gold, 5 dwts., fine copper, 2 dwts. 12 grs. 8. *Another Red Gold.* Fine gold, 5 dwts., fine copper, 1 dwt. 6 grs. 9. *Gold solders for the foregoing Alloys.* Take of the alloyed gold you are using, 1 dwt., fine silver, 6 grs., or 5 grs. silver and 1 gr. copper may be used. 10. *Solder for repairing.* Gold alloyed, 1 dwt., fine silver, 5 grs., pin brass, 1 gr. 11. *Wet Colored Solder.* Wet colored scrap, 3 ozs., fine silver, 10 dwts., fine copper, 5 dwts. 12. *Gold* 15 *Carat, cost* 56*s. or* $14 *per oz.* Fine gold, 1 oz. 18 dwts., fine silver, 12 dwts. 12 grs., fine copper, 10 dwts. 13. Fine gold, 1 oz., fine silver, 8 dwts., fine copper, 4 dwts. 14.

Fine gold, 1 oz., fine silver, 8 dwts., fine copper, 4 dwts. 15. Fine gold, 1 oz., fine silver, 6 dwts., fine copper, 8 dwts. 16. *Gold Solder for the last.* Gold scrap, 1 oz., fine silver, 5 dwts. 17. *Gold, good color* Fine gold, 1 oz., fine silver, 6 dwts., fine copper, 4 dwts. 18. *Gold cost* 60s. *or* $15, *good color.* Fine gold, 1 dwt., fine silver, 6 dwts., fine copper, 4 dwts. 19. *Wet colored solder.* Scrap gold, 4 ozs., fine silver, 13 dwts., fine copper, 6 dwts. 16 grs. 20. *To reduce* 22 *Carat into Wet colored Gold.* Gold coins, 4 ozs. 8 dwts., fine silver, 13 dwts., fine copper, 1 oz. 13 dwts. 21. *To reduce* 22 *Carat to ordinary Wet colored Gold with scrap.* Coins, 1 oz., fine gold, 3 ozs., fine silver, 17 dwts. 12 grs., fine copper, 2 oz. 1 dwt. 12 grs., scrap, 3 oz. 1 dwt. 22. *Another way with scrap.* Coins, 3 ozs. 1 dwt. 6 grs., fine gold, 2 ozs., fine silver, 1 oz. 1 dwt., fine copper, 2 ozs. 11 dwts., scrap, 1 oz., 6 dwts. 18 grs. 23. *Another way with scrap.* Coins, 2 ozs, fine gold, 3 ozs. 3 dwts. 8 grs., fine silver, 1 oz. 1 dwt. 4 grs., fine copper, 2 ozs. 10 dwts. 12 grs., scrap, 1 oz. 5 dwts. 24. *To reduce* 22 *Carat to ordinary Wet colored Gold without scrap.* Coins, 1 oz., fine gold, 8 ozs., fine silver, 2 ozs., fine copper, 4 ozs. 14 dwts. 25. *Another way without scrap.* Coins, 1 oz., fine gold, 2 ozs., fine silver, 13 dwts., fine copper, 1 oz. 11 dwts. 26. *Another way without scrap.* Coins, 2 ozs., fine gold, 6 ozs., fine silver, 1 oz. 14 dwts., fine copper, 4 ozs. 2 dwts.

To Wet-Color the foregoing Alloys.—For 5 ozs. of work take saltpetre, 16 ozs., alum, 8 ozs., salt, 8 ozs., all pulverized, and muriatic acid, 2 ozs., dissolve the ingredients gradually in a black-lead pot. When it boils up, add the acid, and stir the whole with a wooden spoon. Having annealed your work and made it perfectly clean, tie in small parcels with platinum or fine silver wire, and when the color boils up immerse it therein for four minutes, moving it about to ensure a perfect contact with all parts of the surface. Then take it out and rinse it well in boiling water, then immerse in the color again for 1½ minutes and rinse well once more in fresh hot water. Now add 2 ozs. of fresh hot water to the color in the pot, which will cause it to sink. When it rises put in your work for 1 minute, rinsing in fresh hot water again, when it will begin to brighten. Now immerse your work for half a minute longer, and rinse for the last time in clean hot water, when it will appear of a most beautiful color.

Alloys, Continued.—1. *Pale gold for coloring Enamelling, or Lapping.*—Fine gold, 1 oz. ; fine silver, 9 dwts. ; fine copper, 2 dwts. 12 grs. 2. *Another ditto*—Fine gold, 1 oz. ; fine silver, 9 dwts. ; fine copper, 3 dwts. 12 grs. 3. *Another ditto.*—Fine gold, 1 oz. ; fine silver, 10 dwts. ; fine copper, 3 dwts. 12 grs. 4. *Enamelling Gold No.* 1.—Fine gold, 1 oz. ; fine silver, 1 dwt. 12 grs. ; fine copper, 2 dwts. 12 grs. 5. *Enamelling Gold from Sterling*—Sterling, 1 oz. ; fine silver, 8 grs. ; fine copper, 2 dwts. 6. *Enamelling Gold Solder*—Gold alloyed, 1 dwt. ; fine silver, 4 grs. 7. *Another ditto, cost* 43s. *stg.*, or $10.75 *per oz.*—Fine gold, 12 dwts. ; fine silver, 7 dwts. 3 grs. ; fine copper, 6 dwts. 8. *Enamelling Gold No.* 2. *cost* 50s. *stg. per oz.*—Fine gold, 1 oz. ; fine silver, 9 dwts. 12 grs.; fine copper, 7 dwts. 12 grs. *Enamelling Gold No.* 3.—Fine gold, 1 oz.; fine silver, 14 dwts. ; fine copper, 8 dwts. 10. *Enamelling Gold No.* 4.—Fine gold, 2 ozs. 5 dwts. ; fine silver, 1 oz. 6 dwts. ; fine copper, 1 oz. ; pin brass, 5 dwts. 11. *Enamelling Gold No.* 5.—Fine gold, 1 oz. ; fine silver, 12 dwts. ; fine copper, 6 dwts. 12. *Enamelling Gold No.* 6. *for transparent enamelling.*—Fine gold, 1 oz. ; fine silver, 14 dwts. ; fine copper, 6 dwts. 13. *Gold solder for enamelled work.*–Fine gold, 1 oz. ; fine silver, 1 oz. ; fine copper, 10 dwts. ; silver solder, 8 dwts. 8 grs. 14. *Pale Gold alloys for polishing, etc. No.* 1.—Fine gold, 1 oz. ; fine silver, 8 dwts. ; fine copper, 3 dwts. 12 grs. 15. *Another, No.* 2.–Fine gold, 1 oz. ; fine silver, 1 dwt. 20 grs. ; fine copper, 1 dwt. 4 grs. 16. *Pale* 18 *Carat Gold.*–Fine gold, 1 oz. ; fine silver, 4 dwts.; fine copper, 2 dwts. 15 grs. 17. *Another, pale* 18 *Carat Gold.*–Fine gold, 1 oz. 12 grs. ; fine silver, 3 dwts. 8 grs. ; fine copper, 3 dwts. 8 grs. 18. *Pale Gold Solder.*–Gold alloyed, 1 dwt. 6 grs. ; fine silver, 1 dwt. 19. *Alloy for best Pens.*–Fine gold, 1 oz. ; fine silver, 5 dwts. ; fine copper, 7 dwts. 18 grs. ; spelter, 1 dwt. 6 grs. 20. *Solder for ditto.*—Fine gold, 12 dwts. ; fine silver, 7 dwts. 3 grs. ; fine copper, 6 dwts. 21. *Medium quality pens.*—Fine

gold, 1 oz.; composition, 1 oz. 13 dwts. 22. *Composition for the last.*—Fine silver, 1 oz. 17 dwts.; fine copper, 5 ozs. 15 dwts.; spelter, 18 dwts. 20 grs. 23. *Solder for ditto.*—Fine gold, 1 oz.; fine silver, 2 ozs.; pin brass, 1 oz. 24. *Gold for common pens.*—Fine gold, 1 oz.; fine silver, 2 ozs.; fine copper, 1 oz. 25. *Solder for ditto.*—Fine gold, 1 oz.; fine silver, 2 oz.; pin brass, 1 oz. 26. *Alloys of gold with Brass, No.* 1.—Fine gold, 1 oz.; fine silver, 5 dwts. 6 grs.; fine copper, 3 dwts. 12 grs.; pin brass, 18 dwts. 27. *Another ditto. No.* 2.—Fine gold, 1 oz.; fine silver, 4 dwts.; fine copper, 4 dwts.; pin brass, 16 dwts. 28. *Another ditto. No.* 3.—Fine gold, 1 oz.; fine silver, 5 dwts. 12 grs.; fine copper, 3 dwts. 12 grs.; pin brass, 19 dwts. 6 grs. 29. *Another alloy.*—Fine gold, 1 oz.; fine silver, 3 dwts. 21 grs.; fine copper, 9 dwts. 3 grs.; composition, 5 dwts. 6 grs. 30. *Another, ditto.*—Fine gold, 15 dwts. 9 grs.; fine silver, 5 dwts. 19 grs.; fine copper, 3 dwts. 21 grs.; composition, 15 dwts. 31. *Composition for the last two alloys.*—Finest copper, 1 oz.; spelter, 5 dwts. 32. *Solder for foregoing alloys.*—Gold alloyed, 1 dwt.; fine silver, 12 grs. 33. *Imitation Gold, costs* 87*c. per oz.* Fine silver, 2 oz. 5 dwts.; fine copper, 1 oz.; composition, 1 oz.; keeps its color very well. 34. *Composition for ditto.*—Fine copper, 11 ozs.; spelter, 2 ozs. 35. *"California" Gold.*—Fine gold, 5 ozs. 12 dwts.; composition, 7 ozs. 17 dwts. 36 *Composition for "California."*—Fine silver, 7 ozs. 17 dwts.; fine copper, 33 ozs. 12 dwts.; spelter, 5 ozs. 22 dwts. 37. *Medium Gold.*—Fine gold, 1 oz.; fine silver, 12 dwts.; fine copper, 13 dwts. 38. *Bright Gold.*—Fine gold, 1 oz.; fine silver, 7 dwts.; composition marked No. 34, 1 dwt. 6 grs. 39. *Common Gold No.* 1.—Fine gold, 1 oz.; fine silver, 8 dwts.; composition No. 34, 1 oz. 12 dwts. 41. *Common Gold No.* 2.—Fine gold, 5 dwts.; fine silver, 3 dwts. 6 grs.; fine copper, 6 dwts. 12 grs. 42. *Gold for Pens.*—Fine gold, 1 oz.; fine silver, 5 dwts.; fine copper, 1 oz.; spelter, 5 dwts. 33. *Dry Colored Scrap reduced to* 35*s. or* $8.75 *Gold.*—Colored scrap, 1 oz. 9 dwts. 12 grs.; fine silver, 2 dwts.; fine copper, 17 dwts. 12 grs.; spelter, 4 dwts. 44. *Alloy for Gold Chains.*—Fine gold, 11 dwts. 6 grs.; fine silver, 2 dwts. 5 grs.; fine copper, 6 dwts. 13 grs. 45. *Another ditto.*—Fine gold, 1 oz.; fine silver, 9 dwts.; fine copper, 8 dwts. 46. *Gold worth* 45 *stg. or* $11.25.—Fine gold, 1 oz.; composition, (see No. 22) 1 oz. 47. *Solder for ditto.*—Fine gold, 1 oz.; fine silver, 15 dwts.; fine copper, 15 dwts. 48. 12 *Carat Gold.*—Fine gold, 1 oz.; fine silver, 10 dwts.; fine copper, 9 dwts. 6 grs. 49. *Common Gold from "California."*—"California," (see No. 35) 8 ozs.; fine silver, 13 ozs. 16 dwts.; fine copper, 6 ozs. 16 dwts. 50. 29*s.* or $7.25 *Gold.*—Fine gold, 1 oz. 13 dwts. 6 grs.; fine silver, 1 oz. 12 dwts. 12 grs.; fine copper, 1 oz. 16 dwts. 6 grs.; spelter, 4 dwts. Stands nitric acid very well.

ALLOYS FOR GOLD.—1. *Red gold.*—Copper, 66.67 parts; gold, 33.33 parts. 2. *Yellow gold.*—Copper, 12.50 parts; silver, 37.50 parts; gold, 50 parts. 3. *Green gold.*—Silver, 25 parts; gold, 75 parts. 4. *Yellow gold.*—Silver, 66.67 parts; gold, 33.33 parts. 5. *Grey gold.*—Silver, 5.89 parts; gold, 88.23 parts; iron, 5.89 parts. 6. *Dentist's gold.*—Silver, 8.34 parts; platinum, 66.67 parts; gold, 24.29 parts. 7. *English gold coin.*—Copper, 8.34 parts; gold, 91.66 parts. 8. *American gold coin.*—Copper, 10 parts; gold 90 parts. French gold coin same as American. 10. *Alloys for Silver Coin and Plate.—English standard.* Copper, 7.50 parts; silver, 92.50 parts. 11. *American ditto.*—Copper, 10 parts; silver 90 parts. French the same.

ALLOY FOR WATCH PINION SOCKETS.—Gold, 31 parts; silver, 19 parts; copper, 39 parts; palladium, 1 part.

NEW FRENCH PATENT ALLOY FOR SILVER.—Messieurs De Roulz & Fontenay have invented the following alloy, which may be used for almost all purposes in which silver is usually applied: Silver, 20 parts; purified nickel, 28 parts; copper, 52 parts. Melt the copper and nickel in the granular state, then introduce the silver. The flux to be employed is charcoal and borax, both in the state of powder; and the ingots obtained are to be rendered malleable by annealing for a considerable time in powdered charcoal.

JEWELLER'S ALLOYS.—SOLDER, &C.—*Eighteen-carat gold for rings.*—Gold coin, 19½ grs., pure copper, 3 grs.; pure silver, 1½ gr. *Cheap gold, twelve carat.*—Gold coin, 25 gr.; pure copper, 13½ grs.; pure silver, 7⅓ grs. *Very cheap four-carat gold.*—Copper, 18 parts; gold, 4 parts; silver, 2 parts. *Imitation of*

gold.—1. Platina, 4 dwts.; pure copper, 2¼ dwts.; sheet-zinc, 1 dwt.; block-tin, 1¾ dwt.; pure lead, 1½ dwt. If this should be found too hard or brittle for practical use, re-melting the composition with a little sal-ammoniac will generally render it malleable as desired. 2. Platina, 2 parts; silver, 1 part; copper, 3 parts. These compositions, when properly prepared, so nearly resemble pure gold it is very difficult to distinguish them therefrom. A little powdered charcoal, mixed with metals while melting will be found of service. *Best oreide of gold.*—Pure copper, 4 oz.; sheet zinc, 1¾ oz.; magnesia, ⅝ oz.; sal-ammoniac, 1/32 oz.; quick-lime, 9.32 oz.; cream tartar, ⅞ oz. First melt the copper at as low temperature as it will melt; then add the zinc, and afterwards the other articles in powder, in the order named. Use a charcoal fire to melt these metals. *Bushing Alloy for Pivot-holes, &c.*—Gold coin, 3 dwts.; silver, 1 dwt. 20 grs.; copper, 3 dwts. 20 grs.; palladium, 1 dwt. The best composition known for the purpose named. *Gold Solder for Fourteen to Sixteen-carat Work.*—Gold coin, 1 dwt.; pure silver, 9 grs.; pure copper, 6 grs.; brass, 3 grs. *Darker solder.*—Gold coin, 1 dwt.; pure copper, 8 grs.; pure silver, 5 grs.; brass, 2 grs.; melt together in charcoal fire. *Solder for Gold.*—Gold, 6 dwts.; silver, 1 dwt.; copper, 2 dwts. *Soft Gold Solder.*—Gold, 4 parts; silver, 1 part; copper, 1 part. *Solders for Silver* (For the use of jewellers).—Fine silver, 19 dwts.; copper, 1 dwt.; sheet brass, 10 dwts. *White Solder for Silver.*—Silver, 1 oz.; tin, 1 oz. *Silver Solder for Plated Metal.*—Fine silver, 1 oz.; brass, 10 dwts. *Solders.—For Gold.*—1. Silver, 7 parts; copper, 1 part, with borax. 2. Gold, 2 parts; silver, 1 part; copper, 1 part. 3. Gold, 3 parts; silver, 3 parts; copper, 1 part; zinc, ½ part. *For Silver.*—Silver, 2 parts; brass, 1 part, with borax or, silver, 4 parts; brass, 3 parts; zinc, 1.18 part, with borax. *Gold Solders.*—1. Copper, 24.24 parts; silver, 27.57 parts; gold, 48.19 parts. 2. *Enamel Solder.*—Copper, 25 parts; silver, 7.07 parts; gold, 67.93 parts. 3. Copper, 26.55 parts; zinc, 6. 25 parts; silver, 31.25 parts; gold, 36 parts. 4. *Enamel Solder.*—Silver, 19. 57 parts; gold, 80.43 parts. *Solder.—For* 22 *carat gold.*—Gold for 22 carats, 1 dwt,; silver, 2 grs.; copper, 1 gr. *For* 18 *carat gold.*—Gold, 18 carats, 1 dwt.; silver, 2 grs.; copper, 1 grs. *For cheaper gold.*—Gold, 1 dwt.; silver, 10 grs.; copper, 8 grs. *Cheaper still.*—Fine gold, 1 dwt.; silver, 1 dwt.; copper, 1 dwt.

ORDINARY BRIGHT GOLD WIRE, TABLE SHOWING THE PROPORTIONS OF ALLOY FROM 1 OZ. UP TO 21 OZ.

Fine Gold.			Fine Silver.			Fine Copper.			Total.		
Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.	Oz.	Dwts.	Grs.
0	5	21	0	6	6	0	6	21	1	0	0
0	11	18	0	14	12	0	13	18	2	0	0
0	17	15	1	1	18	1	0	15	3	0	0
1	15	6	2	3	12	2	1	6	6	0	0
2	12	21	3	5	6	2	1	21	9	0	0
3	10	12	4	7	0	4	2	12	12	0	0
4	8	3	5	8	18	5	3	3	15	0	0
5	4	18	6	10	12	6	3	18	18	0	0
6	3	8	7	12	6	2	4	9	21	0	0

GOLD.—To find the number of carats of gold in an object, first weigh the gold and mix with seven times its weight in silver. This alloy is beaten into thin leaves, and nitric acid is added; this dissolves the silver and copper. The remainder (gold) is then fused and weighed; by comparing the first and last weights the number of carats of pure gold is found. This operation is always repeated several times, and if any difference occurs in the result, all is done over again.

To Fuse Gold Dust.—Use such a crucible as is generally used for melting brass; heat very hot; then add your gold dust mixed with powdered borax;—after some time a scum or slag will arise on the top, which may be thickened by the addition of a little lime or bone ash. If the dust contains any of the more oxidizable metals, add a little nitre, skim off the slag or scum very carefully; when melted, grasp the crucible with strong iron tongs and pour off immediately into cast iron moulds, slightly greased. The slag and crucibles may be afterwards pulverized, and the auriferous matter recovered from the mass through cupellation by means of lead.

To Refine Gold.—If you desire to refine gold from the baser metals, swedge or roll it out very thin, then cut into narrow strips and curl up so as to prevent its lying flatly. Drop the pieces thus prepared into a vessel containing good nitric acid, in the proportion of acid, 2 ozs., and pure rain-water, ½ oz. Suffer to remain until thoroughly dissolved, which will be the case in from ½ an hour to 1 hour. Then pour off the liquid carefully, and you will find the gold, in the form of yellow powder, lying at the bottom of the vessel. Wash this with pure water till it ceases to have an acid taste, after which you may melt and cast into any form you choose. Gold treated in this way may be relied on as perfectly pure.

In melting gold use none other than a charcoal fire, and during the process sprinkle saltpetre and potash into the crucible occasionally. Do not attempt to melt with stone coal, as it renders the metal brittle and otherwise imperfect.

To Recover the Gold lost in Coloring.—Dissolve a handful of sulphate of iron in boiling water, then add this to your "color" water, it precipitates the small particles of gold. Now draw off the water, being very careful not to disturb the auriferous sediment at the bottom. You will now proceed to wash the sediment from all trace of acid with plenty of boiling water; it will require 3 or 4 separate washings, with sufficient time between each to allow the water to cool and the sediment to settle, before pouring the water off. Then dry in an iron vessel by the fire and finally fuse in a covered skittle pot with a flux.

Gold is taken from the surface of silver by spreading over it a paste made of powdered sal-ammoniac, with aquafortis, and heating it till the matter smokes, and is nearly dry; when the gold may be separated by rubbing it with a scratch brush.

To Recover Gold from Gilt Metal.—Take a solution of borax water, apply to the gilt surface, and sprinkle over it some finely powdered sulphur; make the article red hot, and quench it in water; then scrape off the gold, and recover it by means of lead.

To Cleanse Gold Tarnished in Soldering.—The old English mode was to expose all parts of the article to a uniform heat, allow it to cool, and then boil until bright in urine and sal-ammoniac. It is now usually cleaned with diluted sulphuric acid. The pickle is made in about the proportion of one-eighth of an ounce of acid to one ounce of rain water.

To Remove Soft Solder from Gold.—Place the work in spirits of salts, or remove as much as possible with the scraper, using a gentle heat to enable you to get off the solder more easily. Very useful to be known where hard soldering is required, either in bright or colored work.

Jeweller's Gold Compositions.—*Common Gold.*—Silver, 1 part; Spanish copper, 16 parts, gold, 2 parts; mix. *Ring Gold.*—Spanish copper, 6 parts; silver, 3 parts; gold, 5 parts; mix. *Mannheim Gold.*—Copper, 3 parts; zinc, 1 part. Melt, and stir well. *Mosaic Gold.*—Copper and zinc, equal parts; melt at the lowest temperature that will fuse the former, then mix by stirring, and add 5 per cent. more zinc. *Parker's Mosaic Gold.*—Copper, 100 parts; zinc, 54 parts. *For common Jewellery.*—Copper, 3 parts; 1 of old brass, and 4 oz. of tin to every lb. of copper. *Factitious Gold.*—Copper, 16 parts; platinum, 7 parts; zinc, 1 part; fused together. This alloy resembles gold of 16 carats fine, or ⅔, and will resist the action of nitric acid, unless very concentrated and boiling. *Harmstadt's True Imitation of Gold* is

stated not only to resemble gold in color, but also in specific gravity and ductility. Platinum, 16 parts; copper, 7 parts; zinc, 1 part; put it in a crucible, cover with charcoal powder, and melt into a mass. *Do. of Silver.*—Copper, ½ oz.; brass, 2 oz.; pure silver, 3 oz.; bismuth, 2 oz.; saltpetre, 2 oz.; common salt, 1 oz.; arsenic, 1 oz.; potash, 1 oz.; melt in a crucible with powdered charcoal. This compound, used by a German chemist for unlawful purposes, was so perfect that he was never discovered.

Artificial Gold.—This is a new metallic alloy which is now very extensively used in France as a substitute for gold. Pure copper, 100 parts; zinc, or, preferably, tin, 17 parts; magnesia, 6 parts; sal-ammoniac, 3-6 parts; quick-lime, 1 part; tartar of commerce, 9 parts; are mixed as follows: The copper if first melted, and the magnesia, sal-ammoniac, lime and tartar are then added separately, and by degrees, in the form of powder, the whole is now briskly stirred for about ½ an hour so as to mix thoroughly; and when the zinc is added in small grains by throwing it on the surface, and stirring till it is entirely fused, the crucible is then covered, and the fusion maintained for about 35 minutes. The surface is then skimmed, and the alloy is ready for casting. It has a fine grain, is malleable, and takes a splendid polish. It does not corrode readily, and for many purposes, is an excellent substitute for gold, When tarnished, its brilliancy can be restored by a little acidulated water. If tin be employed instead of zinc, the alloy will be more brilliant. It is very much used in France, and must ultimately attain equal popularity here.

Colored Gold.—1. *Full red gold.*—Gold, 5 dwts.; copper, 5 dwts. 2. *Red gold.*—Gold, 5 dwts.; silver, 1 dwt.; copper, 4 dwts. 3. *Green Gold.*—Gold, 2 dwt.; silver, 21 gr. 4. *Grey gold.*—Gold, 3 dwts.15 grs.; silver, 1 dwt. 9 gr. 5. *Blue gold.*—Gold, 5 dwt.; steel filings, 5 dwt. 6. *Antique gold, greenish-yellow color.*—Gold, 18 dwts. 9 gr.; silver, 21 gr.; copper, 18 gr. These all require to be submitted to the process of wet coloring. 7. *Fictitious gold, very bright.*—Copper, 16 parts; platina, 7 parts; zinc, 1 part; fused together.

A Bright Gold Tinge may be given to silver by steeping it for a suitable length of time in a weak solution of sulphuric acid and water strongly impregnated with iron-rust.

French Gold Plate.—1. Gold, 92 parts; copper, 8 parts. 2. Gold, 84 parts; copper, 16 parts. 3. Gold, 75 parts; copper, 25 parts. *Jewellers' Metal.*—Copper, 30 parts; tin, 7 parts; brass, 10 parts; mix.

Gilding Metal for common jewellery is made by mixing 4 parts copper with one of calamine brass. Sometimes 1 lb. copper, with 6 ozs. of brass. *Dentists' Plate.*—No. 1. Gold, 20 dwts.; silver, 1 dwt.; copper, 2 dwts. 2. Gold, 21, silver, 2, copper. *Gold for Springs.*—Gold, 18 dwts. 12 grs.; silver, 6 dwts.; copper, 5 dwts.

Spot Gilding, or gilding in spots, producing a very fine appearance, is done by putting a thin coat of oil on those parts of the metal where you do not wish the gilding to appear, the gold will then be deposited in those spots only where there is no oil, and the oil is easily removed when the job is finished.

To Hard Solder Gold, Silver, Copper, Brass, Iron, Steel or Platina.—The solders to be used for gold, silver, copper and brass are given in the preceding part. You commence operations by reducing your solder to small particles, and mixing it with powdered sal-ammoniac and powdered borax in equal parts, moistened to make it hold together. Having fitted up the joint to be soldered, you secure the article upon a piece of soft charcoal, lay your soldering mixture immediately over the joint, and then with your blow-pipe turn the flame of your lamp upon it until fusion takes place. The job is then done, and ready to be cooled and dressed up. Iron is usually soldered with copper or brass in accordance with the above process. The best solder for steel is pure gold or pure silver, though gold or silver solders are often used successfully. Platina can only be soldered well with gold; and the expense of it, therefore, contributes to the hindrance of a general use of platina vessels, even for chemical purposes, where they are of so much importance.

To Soft Solder Articles.—Moisten the parts to be united with soldering fluid; then, having joined them together, lay a small piece of solder upon the joint and hold over your lamp, or direct the blaze upon it with your blow-pipe until fusion is apparent. Withdraw them from the blaze immediately, as too much heat will render the solder brittle and unsatisfactory. When the parts to be joined can be made to spring or press against each other, it is best to place a thin piece of solder between them before exposing to the lamp. Where two smooth surfaces are to be soldered one upon the other, you may make an excellent job by moistening them with the fluid, and then, having placed a sheet of tin foil between them, holding them pressed firmly together over your lamp till the foil melts. If the surfaces fit nicely, a joint may be made in this way so close as to be almost imperceptible. The bright looking lead which comes as a lining to tea boxes works better in the same way than tin foil.

English Standard for Silver.—Pure silver, 11 ozs. 2 dwts.; copper, 22 dwts.; melt. *Silver Imitation.*—Copper, 1 lb.; tin, ¾ oz.; melt. This composition will roll and ring very near to silver.

For Silversmiths, *Sterling Silver.*—1. Fine silver, 11 ozs. 2 dwts.; fine copper, 18 dwts. 2. *Equal to Sterling.*—Fine silver, 1 oz.; fine copper, 1 dwt. 12 grs. 3. *Another ditto.*—Fine silver, 1 oz.; fine copper, 5 dwts. 4. *Common Silver for Chains.*—Fine silver, 6 dwts.; fine copper, 4 dwts. 5. *Solder for ditto.*—Fine silver, 16 dwts.; fine copper, 12 grs.; pin brass, 3 dwts. 12 grs. 6. *Alloy for Plating.*—Fine silver, 1 oz.; fine copper, 10 dwts. 7. *Silver Solder.*—Fine silver, 1 oz.; pin brass, 10 dwts.; pure spelter, 2 dwts. 8. *Copper Solder for Plating.*—Fine silver, 10 dwts.; fine copper, 10 dwts. 9. *Common Silver Solder.*—Fine silver, 10 ozs.; pin brass, 6 ozs. 12 dwts.; spelter, 12 dwts. 10. *Silver Solder for Enamelling,* $1 *per oz.*—Fine silver, 14 dwts.; fine copper, 8 dwts. 11. *Ditto, for Filling Signet Rings.*—Fine Silver, 10 ozs.; fine copper, 1 oz. 16 dwts.; fine pin brass, 6 ozs. 12 dwts.; spelter, 12 dwts. 12. *Silver Solder for Gold Plating.*—Fine silver, 1 oz.; fine copper, 5 dwts.; pin brass, 5 dwts. 13. *Quick Silver Solder.*—Fine silver, 1 oz.; pin brass, 10 dwts.; bar tin, 2 dwts. 14. *Imitation Silver.*—Fine silver, 1 oz.; nickel, 1 oz. 11 grs.; fine copper, 2 ozs. 9 grs. 15. *Another Ditto.*—Fine silver, 3 ozs.; nickel, 1 oz. 11 dwts.; fine copper, 2 ozs. 9 grs.; spelter, 10 dwts. 16. *Fine Silver Solder for Filigree Work.*—Fine silver, 4 dwts. 6 grs.; pin brass, 1 dwt. 17. *Bismuth Solder.*—Bismuth, 3 ozs.; lead, 3 ozs. 18 dwts.; tin, 5 ozs. 6 dwts.

To Refine Silver.—Dissolve in nitric acid as in the case of the gold When the silver has entirely disappeared, add to the 2½ ozs. of solution nearly 1 qt. of pure rain water. Sink, then, a sheet of clean copper into it; the silver will collect rapidly upon the copper, and you can scrape it off and melt into bulk at pleasure.

In the event of your refining gold in accordance with the foregoing formula, and the impurity was silver, the only steps necessary to save the latter would be to add the above named proportion of water to the solution poured from the gold, and then to proceed with your copper plate as just directed.

To Extract Silver from Waste Products.—Mix your refuse with an equal quantity of wood charcoal, place in a crucible and submit to a bright red heat, and in a short time a silver button will be found at the bottom. Carbonate of soda is another good flux.

To Clean Silver Tarnished in Soldering.—Some expose to a uniform heat, as in the case of gold, and then boil in strong alum water. Others immerse for a considerable length of time in a liquid made of ½ oz. of cyanuret potassa to 1 pt. rain water, and then brush off with prepared chalk.

To Wash Silverware.—Never use a particle of soap on your silverware, as it dulls the lustre, giving the article more the appearance of pewter than silver. When it wants cleaning, rub it with a piece of soft leather and prepared chalk, the latter made into a kind of paste with pure water, for the reason that water not pure might contain gritty particles.

Ornamental Designs on Silver.—Select a smooth part of the silver, and sketch on it a monogram or any other design you choose, with a sharp lead pencil, then place the article in a gold solution with the battery in good working order, and in a short time all the parts not sketched with the lead pencil will be covered with a coat of gold. After cleansing the article, the black lead is easily removed by the fingers, and the silver ornament disclosed. A gold ornament may be produced by reversing the process.

Dead White on Silver Articles.—Heat the article to a cherry red, or a dull red heat and allow it to cool, then place it in a pickle of 5 parts sulphuric acid to 100 parts of water, and allow it to remain for an hour or two. If the surface is not right, rinse in cold water, and repeat the heating and pickling operation as before. This removes the copper from the *surface* of the article, leaving *pure* silver on the surface. When sufficiently whitened, remove from the pickle, well rinse in pure hot water and place in warm box sawdust.

To Frost Polished Silver.—Cyanide of potassium, 1 oz.; dissolved in ½ pt. of water. Do not hold the silver in your hands, but use pliers made of lance wood or box wood, and apply the mixture with a brush to the polished surface.

Silvering Shells.—Silver leaf and gum water, a sufficient quantity; grind to a proper thickness, and cover the inside of the shells. For a Gold Color, grind up gold leaf with gum water, and apply to the inside of the shells.

Liquid Foil for Silvering Glass Globes, &c.—Lead, 1 part; tin, 1 part; bismuth, 1 part; melt, and, just before it sets, add mercury, 10 parts. Pour this into the globe, and turn it rapidly round.

Silvering Hooks and Eyes, &c.—The small iron articles are suspended in dilute sulphuric acid until the iron shows a bright clean surface. After rinsing in pure water they are placed in a bath of a mixed solution of sulphate of zinc, sulphate of copper and cyanide of potassium, and there remain until they receive a bright coating of brass. Lastly, they are transferred to a bath of nitrate of silver, cyanide of potassium and sulphate of soda, in which they quickly receive a coating of silver.

Pickle for Frosting and Whitening Silver Goods.—Sulphuric acid, 1 dr.; water, 4 ozs.; heat the pickle, and immerse the silver in it until frosted as desired; then wash off clean, and dry with a soft linen cloth, or in fine clean sawdust. For whitening only, a smaller proportion of acid may be used.

To Silver Clock Faces, &c.—Old silver lace, ½ oz.; nitric acid, 1 oz. Boil them over a gentle fire for about 5 minutes, in an earthen pot. After the silver is dissolved take the mixture off, and mix it in a pint of clean water, then pour it into another vessel free from sediment; then add a tablespoonful of common salt, and the silver will be precipitated in the form of a white powder or curd; pour off the acid, and mix the curd with 2 oz. salt of tartar, and ½ oz. whiting, all together, and it is ready for use. To Use.—Clean your brass or copper plate with rotten-stone and a piece of old hat; rub it with salt and water with your hand. Then take a little of the composition on your finger, and rub it over your plate, and it will firmly adhere and completely silver it. Wash it well with water. When dry, rub it with a clean rag, and varnish with this varnish for clock faces. Spirits of wine, 1 pt.; divide in three parts, mix one part with gum-mastic in a bottle by itself; 1 part spirits and ½ oz. sandarac in another bottle; and 1 part spirits and ½ oz. of whitest gum benjamin, in another bottle; mix and temper to your mind. If too thin, some mastic; if too soft, some sandarac or benjamin. When you use it, warm the silvered plate before the fire, and, with a flat camel's-hair pencil, stroke it over till no white streaks appear, and this will preserve the silvering for many years.

Silver Solders.—1. (*Hard.*) Copper, 30 parts; zinc, 12.85 parts; silver, 57.15 parts. 2. Copper, 23.33 parts; zinc, 10.00 parts; silver, 66.67 parts. 3. Copper, 26.66 parts; zinc, 10.00 parts; silver, 63.34 parts. 4.

(*Soft.*) Copper, 14.75 parts; zinc, 8.50 parts; silver, 77.05 parts. 5. Copper, 22.34 parts; zinc, 10.48 parts; silver, 67.18 parts. 6. Tin, 63.00 parts; lead, 37 parts.

To Make and Apply Silver-Plating Solution.—Put together in a glass vessel 1 oz. nitrate of silver, 2 ozs. cyanuret potassa, 4 ozs. prepared Spanish whiting, and 10 ozs. pure rain water. Cleanse the article to be plated as per preceding directions, and apply with a soft brush. Finish with the chamois skin or burnisher.

To Make and Apply Silver-Plating Powder.—Dissolve silver in nitric acid by the aid of heat; put some pieces of copper into the solution to precipitate the silver; wash the acid out in the usual way; then, with 15 grains of it, mix 2 drachms of tartar, 2 drachms of table salt, and ½ drachm of pulverized alum. Brighten the article to be plated with lye and prepared chalk, and rub on the mixture. When it has assumed a white appearance, expose to heat as in the case of plating with gold amalgam, then polish up with the burnisher or soft leather.

Silver Plating Fluid.—Dissolve 1 oz. of nitrate of silver, in crystals, in 12 ozs. of soft water; then dissolve in the water 2 ozs. cyanuret of potash; shake the whole together, and let it stand till it becomes clear. Have ready some half-ounce vials, and fill half full of Paris white, or fine whiting; and then fill up the bottles with the liquor, and it is ready for use. The whiting does not increase the coating power; it only helps to clean the articles, and saves the silver fluid, by half filling the bottles.

Cold Silvering of Metals.—Mix 1 part of chloride of silver with 3 parts of pearlash, 1½ parts common salt, and 1 part whiting; and well rub the mixture on the surface of brass or copper (previously well cleaned), by means of a piece of soft leather, or a cork moistened with water and dipped in the powder. When properly silvered, the metal should be well washed in hot water, slightly alkalized; then wiped dry.

Silvering Solution for Electrotype Plates.—Nitrate of silver, 2 drachms; distilled water, 37 drachms. Dissolve, and add sal-ammoniac, 1 drachm; hydrophosphite of soda, 4 drachms; precipitated chalk, 4 drachms. Agitate the preparation occasionally for 12 hours, when it will be ready for use. Apply with a fine sponge.

Silvering by Heat.—Dissolve 1 oz. silver in nitric acid; add a small quantity of salt; then wash it and add sal-ammoniac, or 6 ozs. of salt and white vitriol; also ½ oz. corrosive sublimate; rub them together till they form a paste; rub the piece which is to be silvered with the paste; heat it till the silver runs, after which dip it in a weak vitriol pickle to clean it.

Mixture for Silvering.—Dissolve 2 ozs. of silver with 3 grs. of corrosive sublimate; add tartaric acid, 4 lbs.; salt, 8 qts.

To Separate Silver from Copper.—Mix sulphuric acid, 1 part; nitric acid, 1 part; water, 1 part; boil the metal in the mixture till it is dissolved; throw in a little salt to cause the silver to subside.

To Write in Silver.—Mix 1 oz. of the finest pewter or block tin and 2 ozs. of quicksilver together till both become fluid, then grind it with gum water, and write with it. The writing will then look as if done with silver.

Silvering Powder.—Nitrate of silver and common salt, of each, 30 grs.; cream tartar, 3½ drachms; pulverize finely and bottle for use. Unequalled for polishing copper and plated goods.

To Refine Sweepings Containing Gold or Silver.—To 8 ozs. of the dirt, which has been washed and burnt, add salt, 4 ozs.; pearl-ash, 4 ozs.; red tartar, 1 oz.; saltpetre, ½ oz.; mix thoroughly in a mortar, melt in a crucible, and dissolve out the precious metals in a button.

To Separate Gold and Silver from Lace, &c.—Cut in pieces the gold or silver lace, tie it tightly, and boil in soap lye till the size appears diminished; take the cloth out of the liquid, and after repeated rinsings in cold water, beat it with a mallet to draw out the alkali. Open the linen and the pure metal will be found in all its beauty.

Polishing Powder for Gold and Silver.—Rock alum burnt and

finely powdered, 5 parts; levigated chalk, 1 part. Mix; apply with a dry brush.

Gold, to Test.—Articles made of gold have their value regulated according to a certain standard. Articles of pure gold, for instance, are represented to be of twenty-four parts or *carats*, but if there is any alloy, then this is deducted from the whole. Plate is not legally sold as gold, except it be of standard purity, and to ascertain this, it undergoes an examination of the assay master of the Goldsmiths' Company, and if found of the correct standard, it is stamped with what is termed *the hall mark*. This mark is a peculiar and distinctive one, and although many close imitations of it appear on spurious metals, yet, if it is once closely observed, it will always serve as an infallible guide to persons who are purchasing gold plate and other articles. Gold, or what is represented to be such, may be readily tested by applying a drop of aquafortis to it; if the fluid remains upon the metal in a colorless state, the metal is pure; but if upon applying the aquafortis, a green color appears, the metal is spurious. Another test consists of a smooth black stone called the touchstone; and upon the article to be tested being rubbed upon it, the color of the mark left by pure gold, differing from that made by any of its alloys, at once furnishes a test of the comparative merits of the metals. With respect to many ornaments made and sold by jewellers without the proper stamp, and called gold, they contain only a portion of the precious metal, having as much alloy as jewellers can possibly add without losing the appearance of gold; these articles look very well when new, but frequently soon tarnish and lose their color.

Jewellery, to Clean.—From constant wear, jewellery is apt to become dirty and tarnished, and the process of restoring it to its pristine brightness is very simple. Make a lather of common yellow soap and warm water, wash the articles in this and brush them well, then wipe them dry, and polish them either with a plain leather, or with one upon which a little rouge has been put; after this application, the brilliancy of the jewellery will be restored.

Coloring of Jewellery.—1. *To Heighten the Color of Yellow Gold.*—Saltpetre, 6 ozs.; green copperas, 2 ozs.; white vitriol and alum, of each, 1 oz. If wanted redder, a small quantity of blue vitriol must be added. 2. *For Green Gold.*—Saltpetre, 1 oz. 10 dwts.; sal-ammoniac, 1 oz. 4 dwts.; Roman vitriol, 1 oz. 4 dwts; verdigris, 18 dwts. 3. *To Clean Gilt Jewellery.*—Boiling water in a clean flask, ½ pt.; cyanide of potassium, 1 oz.; shake the flask to dissolve the potassium. Add, when cold, liquor ammonia, ½ oz.; rectified alcohol, 1 oz. Used by brushing over gilded articles. 4. *Coloring Jewellery.*—Boil the articles in a dilute solution of terchloride of gold, to which some bicarbonate of soda has been added. 5. *Coloring of Gilding.*—Defective colored gilding may also be improved by the help of the following mixture: nitrate of potash, 3 ozs.; alum, 1½ oz.; sulphate of zinc, 1½ oz.; common salt, 1½ oz. These ingredients are to be put into a small quantity of water to form a sort of paste which is put on the articles to be colored; they are then put upon an iron plate over a clear fire, so that they will attain nearly to a black heat, when they are suddenly plunged into cold water; this gives them a beautiful high color. Different hues may be had by a variation in the mixture. 6. *For Red Gold.*—To 4 ozs. melted yellow wax, add, in fine powder, 1½ oz. of red ochre; 1½ oz. verdigris, calcined till it yields no fumes; and ½ oz. of calcined borax. Mix them well together. Dissolve either of above mixtures in water, as the color is wanted, and use as required. 7. *Fine Color for Heavy Gilt Work.*—Alum, 3 ozs.; saltpetre, 6 ozs.; sulphate of zinc, 3 ozs.; common salt, 3 ozs. Mix all into a thick paste, dip the articles into it, and heat them until nearly black on a piece of sheet iron over a clear coke or charcoal fire, then plunge them into cold water. 8. *Fine Color for Light Plated Work.*—Sulphate of copper, 2 dwts.; best verdigris, 4 dwts. 12 grains; sal ammoniac, 4 dwts.; saltpetre, 4 dwts.; acetic acid, 1 oz.; pulverize the solid articles, add the acetic acid gradually, stirring all the time. Dip your articles into this mix-

ture and heat them to a black color on a sheet of copper. When cold, place them in a middling strong sulphuric acid pickle, which dissolves the coloring salts, and induces a very fine gold color. 9. *Etruscan Gold Coloring.*—Alum, 1 oz.; fine table-salt, 1 oz.; saltpetre (powdered), 2 ozs.; hot rain-water, sufficient to make the solution, when dissolved, about the consistency of thick ale; then add sufficient muriatic acid to produce the color desired. The degree of success must always depend, in a greater or less degree, upon the skill or judgment of the operator. The article to be colored should be from fourteen to eighteen carats fine, of pure gold and copper only, and be free from coatings of tin, or silver solder. The solution is best used warm, and when freshly made; the principle on which it acts is to eat out the copper alloy from the surface of the article, leaving thereon pure, frosted gold only. After coloring, wash off, first in rain-water, then in alcohol, and dry without rubbing, in fine clean sawdust. Fine Etruscan jewellery, that has been defaced or tarnished by use, may be perfectly renewed by the same process.

To Solder Tortoise Shell.—Bring the edges of the pieces of shell to fit each other, observing to give the same inclination of grain to each, then secure them in a piece of paper, and place them between hot irons or pincers; apply pressure, and let them cool. The heat must not be so great as to *burn* the shell, therefore try it first on a white piece of paper.

Artificial Pearls.—Are made from beads of opaline glass filled with gum, the polish of the glass being reduced by the vapor of hydrofluoric acid.

Reviver for old Jewellery.—Dissolve sal-ammoniac in urine, and put the jewellery in it for a short time; then take it out, and rub with chamois leather, and it will appear equal to new.

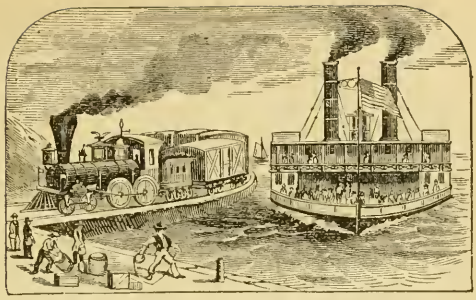
To Cleanse Brushes.—The best method of cleansing watchmakers' and jewellers' brushes is to wash them out in a strong soda water. When the backs are wood you must favor that part as much as possible; for being glued, the water may injure them.

To Cut Glass Round or Oval without a Diamond.—Scratch the glass around the shape you desire with the corner of a file or graver; then, having bent a piece of wire in the same shape, heat it red hot and lay it upon the scratch, sink the glass into cold water just deep enough for the water to come almost on a level with its upper surface. It will rarely ever fail to break perfectly true.

Arrangements of Lapidaries' Cutting Plates.—1. Soft iron (very thin) with diamond dust in oil. 2. Pewter, with coarse emery and water. 3. Pewter, with fine emery and water. 4. Wood, with sand and water. 5. Pewter, with rotten-stone and water. 6. Leather, with putty powder slightly wet.

Polishing Diamonds.—The plan in use at all the large diamond cutters is simply a cast iron disc of good metal, with a vertical spindle run through its centre, balanced, and turned, and faced true in a lathe. The disc revolves at about 1000 revolutions per minute. With a little diamond dust and oil, the stone is set in a small brass cup filled with common soft solder; it is then screwed up in the clamps and applied to the skive till the facets is formed.

To Determine the Exact Focal Distance of Spectacle Glasses.—Place the end of a measure of thirty or forty inches in length against a smooth wall, or other suitable ground, in plain view of some well defined object a few rods distant, as for instance a building or window on the opposite side of the street. Then place the edge of your lens on the measure, and move it backwards or forwards until a spectrum is formed, or, in other words, until a clear and distinct outline of the distant object is produced on the ground against which your measure rests. This point will represent sufficiently near, for all practical purposes, the exact focal distance of the lens, and will correspond in inches with the number of all properly marked convex spectacles. For mending fine steel spectacle frames, use the best gold solder in preference to silver or brass solder.



MACHINISTS, METAL WORKERS, ARTISANS;

MANUFACTURES, TRADES & OCCUPATIONS

OF ALMOST EVERY DESCRIPTION NOT BEFORE MENTIONED IN THESE PAGES, INCLUDING

IRON, STEEL, BRASS, COPPER, TIN, OIL, GLUE, GLASS, &c., &c. STEAM ENGINE AND BOILER MAKING, INSTRUCTIONS TO ENGINEERS, THEIR DUTIES, VARIETIES OF STEAM ENGINES, INCRUSTATION IN BOILERS, MINING, SMELTING, DRILLING, ENAMELLING, PLANING, TRADE SECRETS, FORMULAS, DIAGRAMS, PROCESSES OF MATHEMATICAL CALCULATIONS AND COMPUTATIONS, SAW MILLS, ONE HUNDRED AND FORTY MECHANICAL MOVEMENTS ILLUSTRATED, &C., &C.

INSTRUCTIONS TO ENGINEERS.—*Getting up Steam.*—Before lighting the fire in the morning, raise your safety valve, brushing away all the ashes and dust which may impair its free action, and if it leaks steam grind it on its seat with fine emery or grindstone grit. Valves with vibratory stems are safer than those with rigid stems, as they are not so liable to bind by the lever and weight getting out of true. To guard against loss by leakage and evaporation, leave the water up to the third gauge at night and keep it up to the second gauge during working hours. Clean all ashes and cinders from the furnace and ash pit, and spread a layer of two or three inches of coal over the grate bars; pile on plenty of shavings over the coal, with dry sawdust, split wood, etc., then start your fire. Keep the fire even and regular over the grate bars, about 5 inches thick with soft coal, and about 3 inches with anthracite, and always avoid excessive firing. Moderate charges or firings at intervals of 15 to 20 minutes give the best results. In getting up steam from *cold* water, the fire should be raised gradually, to avoid damaging the boiler by unequal expansion of the iron. Do not keep the damper and furnace door open at the same time, as the extreme draught expels the heat from the furnace into the chimney, and the cold air entering through the door induces a damaging contraction of the boiler plates wherever it strikes, The current of air enters the ash pit with a velocity of 12 feet per second, and every 100 lbs. coal requires about 15.524 cubic feet for its combustion. With *wood* for fuel, the area of grate surface should be 1.9 to 1.3 that for coal. Volume of furnace for *coal* burning, should be

2.75, to 3 cubic feet for every square foot of its grate surface, for *wood* 4, 6, to 5 cubic feet. The use of the pyrometer has satisfactorily established the following facts: 1st. That the admission of a certain quantity of air behind the bridge developes a greater amount of heat for raising steam by assisting combustion and consuming the smoke, the existence of smoke being always a sure sign of waste. 2. A regular and continuous supply of air to the furnace increases its heating powers 33⅓ per cent. 3. The supply of air may enter behind the bridge, through the bars, or through the furnace doors, as long as it is properly regulated. 4. The supply of air may vary with the nature of the fuel; light burning coal requiring less air than caking coal, because the latter becomes a compact mass in the furnace, excluding the air from the bars, while the latter is the reverse. 5. For perfect combustion a high temperature is necessary. In all cases see that the bars are well covered and the fuel kept from caking. Knock away the clinkers as soon as formed, keeping the spaces open between the bars. Regulate the supply of air either by the dampers, ashpit, furnace doors, or by an orifice behind the bridge. A jet of steam from a pipe placed across the top of, and inside the door, will greatly assist in consuming the smoke and intensifying the heat, by yielding up its oxygen and hydrogen.

If steam commences to blow off at the safety valve while the engine is at rest, start your pump or injector to create a circulation, cover or back your fire with a charge of ashes or fresh coal to absorb the heat, and allow the steam to have free egress through the safety valve. If, by neglect, the water gets very low, and the boiler dangerously hot, the fire should either be drawn, or drenched with water. Should the fire be very hot and the water supply temporarily cut off, stop the engine and cover the fire quite thickly with fresh fuel to absorb the heat, keeping the usual allowance of water in the boiler until the supply is renewed. Boilers should be blown out every 2 or 3 weeks, or as often as mud appears in the water, but never until after the fire has been drawn at least one hour, and the damper closed, otherwise the empty boiler might be damaged by the heat. Never fill a *hot* boiler with *cold* water, as the sudden contraction many times repeated will eventually cause it to leak. Never blow out a boiler with a higher pressure than 50 lbs. to the square inch, as steam at a high pressure indicates a high temperature in the iron, which under careful management should always be let down gradually. Previous to filling a boiler raise the valve to permit the free egress of the air which might otherwise do manifold damage.

Use every possible precaution against using foul water as it induces foaming in the boiler; soapy or oily substances and an insufficiency of steam room have a like effect, causing the boiler to burn on the spots where the water is lifted from it, and the glass gauges to indicate falsely, besides damaging the cylinder by priming, carrying mud, grit, water and slush into it through the pipe, and rendering the cylinder heads liable to be knocked out. Steam from pure water at 212° Fahr. supports a 30 inch column of mercury. Steam from sea, or impure water at the same temperature, will support only 22 inches.

Pure soft water derived from lakes and large streams, rain water from cisterns, reservoirs, etc., and springs *outside of limestone districts*, is the best for steam purposes. Water from wells and springs *in limestone districts* and small streams, hold in solution large quantities of chloride of sodium, carbonate of lime, sulphate of lime, etc., besides quantities of vegetable matter, in suspension. The carbonic acid in the water, which holds the carbonate of lime, etc., in solution, being driven off by boiling, the latter is precipitated and forms an incrustation which adheres with obstinate tenacity to the boiler plates. By continual accretion the deposit of scale becomes thicker and thicker, and being a non-conductor of heat it requires 60 per cent. more fuel to raise the water to any given temperature when the scale is ¼ of an inch thick; the conducting power of scale compared with that of iron being as 1 to 37. The red scale formed from water impregnated with salts of iron, derived from percolation through iron ore, is still more mis-

chievous and destructive to steam boilers. In no way can the evil be completely averted except by boiling the water, to drive off the carbonic acid, but this is sometimes impracticable, although many feed water heaters are in successful operation. A list of scale preventives can be found in another part of this work.

In tubular boilers, the hand holes should be opened frequently and all sediment removed from over the fire; keep the sheets, flues, tubes, gauge cocks, glass gauges and connections well swept and perfectly clean, and the boiler and engine-room in neat condition. Keep a sharp look out for leaks, and repair them if possible without delay, and allow no water to come in contact with the exterior of the boiler under any circumstances. Examine and repair every blister as soon as it appears, and make frequent and thorough examinations of the boiler with a small steel hammer.

In case of foaming, close the throttle, and keep closed long enough to show true level of the water. If the water level is right, feeding and blowing will generally stop the trouble. With muddy water it is a safe rule to blow out 6 or 8 inches every day. If foaming is violent from dirty water, or changing from salt to fresh, or from fresh to salt, in addition to following the above directions, check draught, and cover the fires with ashes or fresh fuel.

Great watchfulness is necessary when steam is raised, the safety valve fixed, the fire strong, and the engine at rest. In every case there is a rapid and dangerous absorption of heat, the temperature, latent and sensible heat included, often rising to 1200° Fahr. Frequently it is but the work of an instant to convert the latent into sensible heat, thus generating an irresistible force which bursts the boiler and destroys life and property. The destruction generally coming at the moment of starting the engine, the opening of the valve inducing a commotion in the water, which flashes into steam the instant it touches the heated plates. Steam has been known to rise from a pressure of 32 lbs. to the square inch to 90 lbs. to the square inch, in the short space of *seven* minutes, with the engine at rest. It ought to quicken the vigilance of every engineer to know that the explosive energy in each and every cubic foot of water in his boiler at 60 lbs. pressure, is equal to that contained in 1 lb. of gunpowder.

From avaricious motives it has become quite common to discharge, or to decline to employ, qualified and careful engineers. Incompetent men are employed because their labor costs a few dollars less than that of the former. This is too much of a bad thing to pass over without notice. Employ good skilful men in the management of steam power, or employ none at all, and pay them decent wages. If an oversight takes place, and the best and most careful men are liable to make mistakes, never scold, reprimand, or exact service during dangerous emergencies, as in the event of lost water in the boiler. In no case risk life, limb, or property, and do not let the consideration of saving a few dollars debar you from securing intelligent assistance. The Turkish mode of driving business on a late occasion was to discharge the English engineers who brought out the war vessels which were built in England, and supply the vacancies by installing cheap green hands. After getting up steam the new "Chief" proceeded to start the engines. A lift at a crank produced no results, a pull at the lever was equally useless. At length the illustrious official espied a bright brass cock, and thinking he had got hold of a sure thing this time, proceeded to give it a twist, when he was suddenly saluted with a jet of steam full in the face, which swept the "engineer" and his assistants out of the engine room, into the fire room down stairs. So much for cheap labor and the consequent results.

Duties to the Engine when under steam.—Before starting the engine, warm the cylinder by admitting steam so as to slowly move the piston back and forth, letting the condensed water flow from the drip-cocks, which should be left open all night for this purpose; especially should this be done during cold and frosty weather, during which time all pipes and connections should have extra protection. The minimum speed of the piston should be

240 ft. per minute, and the maximum speed 700 ft. in any engine. The most economical steam pressure is from 80 to 90 lbs. to the square inch, on the piston of any high pressure steam engine. To attain this it is necessary that the boiler pressure should be considerably higher, for there is a loss of at least 30 per cent. arising from the irregularity of the steam pipes and steam ports, by radiation of heat, by improper packing, by friction of valve, by the effect of the governor and by atmospheric pressure, which of itself entails a loss of 15 lbs. per square inch on the piston. The lower the steam pressure per square inch on the piston, the greater the loss of power from the atmospheric pressure; for instance, a steam pressure of 30 lbs. per square inch on the piston, leaves only 15 lbs. per square inch effective pressure for actual work, the other 15 lbs. being required to overcome atmospheric pressure.

In tightening piston rod packing, screw no tighter than merely to prevent leakage; any more consumes power by friction, and will destroy the packing. Spring packing in the cylinder should be adjusted with great care, always kept up to its place, and never allowed to become loose, or leakage will ensue, causing loss of power. On the other hand, if it is set too tight it will cut the cylinder, and loss will result from friction. Keep your packing free from grit, sand, filings, &c., as such substances will cut the cylinder and flute the rod. Remove all old packing before inserting new, observing to cut the packing into proper lengths, and breaking joints by placing each joint on opposite sides of the stuffing box. Keep the governor clean, easy in its movements, and avoid excessive tight packing around the spindle. Use good oils. Avoid waste in the use of oil, as too great profusion generates gum and dirt. Use it with judgment in combination with concentrated lye when it is required to remove gum or dirt from these or other parts of the machinery. Do not lubricate the cylinder until after starting the engine, and closing the drip cocks. If you have occasion to separate a rust joint, or any crank from a shaft on which it has been shrunk, the simplest plan is to apply heat, when the bodies being of different dimensions will expand unequally and separate. Iron when heated expands with irresistible force. Railway contractors know that the heat of the sun on a warm day will cause such an extension of the iron, that the rails, if laid with close joints, will rise with the sleepers from the ballast, and form arches 4 or 5 feet high and 50 or 60 feet in length. In accommodation to this law of expansion, spaces are left between the rails on railway tracks.

The contraction of iron by cold is equally powerful, and has been put to good use in truing up large bulging buildings by fitting iron girders across them with strong wall plates at each end. Then, by applying gas jets all along the girders they will expand; the screws are then tightened up, and the girders allowed to cool, and the strain of these contractions several times repeated is sufficient to bring the walls to the perpendicular. Again, in hoisting heavy machinery, &c., by means of pulley-blocks, if the ropes stretch and the blocks come together too soon, wet the rope, and the object will be elevated by its contraction without any other force. These hints will be found useful when occasion offers.

In driving the kegs on the crank-pin and cross-head, use a leaden mallet, or interpose a piece of leather, or a sheet of soft metal for protection, if a steel hammer is used.

The piston should be removed every 6 months, and the parts injured by friction, &c., carefully ground, fitted, and, if need be, turned, trued, and made steam tight. If knocking occurs in the engine it may arise by the crank being ahead of the steam; if so, move the eccentric forward to give more lead on the valve; if caused by too much lead move the eccentric further back; if caused by the exhaust closing too soon, enlarge the exhaust chamber in the valve; if caused by the engine being out of line, or by hard or tight piston rod packing, these faults must be corrected; if caused by lost motion in the jam nuts on the valve, uncover the steam chest and adjust them

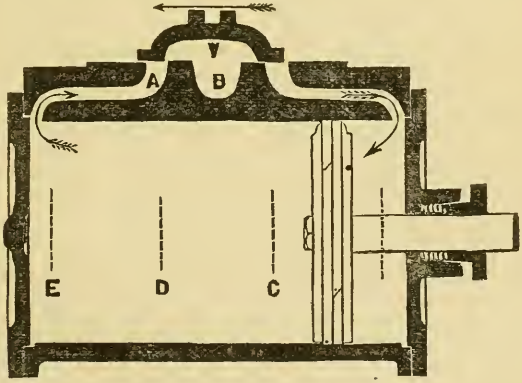
correctly. It may be that knocking is caused by lost motion in the crank-pin, pillow-blocks, key of the piston in the cross-head, or boxes on the cross-head, if so, tighten the key, or file off the edges of the boxes if they are too tight. Should knocking arise from shoulders becoming worn on the ends of the guides from any cause, replace the guides. Knocking may be caused by insufficient counterboring in the cylinder, causing derangement in the movements of the piston. The remedy for this is to *re-counterbore* the cylinder to the proper depth.

Keep a close watch over the journals of the crank and cross-head, if they are loose in the boxes, or too tight, they will run badly, if tightened too much, they will heat and wear out the brass shoes, if not tight enough there is danger of the keys flying out and breaking the engine.

Be sure that your steam gauge indicates truthfully. It ought to tell accurately the *pressure of steam* in the boiler when the water is hotter than 212° Fahr., and indicate the *variation* in the pressure of steam from time to time; but many gauges are much worse than the contrivance used by the colored engineer, who, disdainfully dispensing with a gauge altogether, used to ascertain the critical moment when steam was up, or danger at hand, by clapping his open hand on the outside of the boiler.

Steam Packing.—Many varieties of packing are used, such as metallic packing, packing composed of a mixture of duck, paper and tallow in proper proportions, soapstone and loose twisted cotton coils, asbestos, jute, &c. An excellent packing is composed of hemp in long, loosely twisted coils, well saturated with melted grease or tallow, with as much pulverized black lead as it will absorb. Packing is always applied with the best effect when the parts of the engine are cold, and its efficiency is promoted by soaking it in beeswax and tallow previous to use.

To Work Steam Expansively.—The volume of steam at 15 lbs. pressure to the square inch or atmospheric pressure is 1700 times greater than that of any given quantity of water from which it may be derived. When confined under pressure, as in the cylinder of a steam engine, it is always in the effort to expand itself to the fullest extent, and a vast saving of fuel is effected by cutting off the supply of steam from the piston by means of the main valve, before it reaches the end of its stroke, instead of allowing it to flow during the full length of its stroke.



The most available points at which to cut off steam is $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ of the full travel or stroke of the piston. If steam at 75 lbs. pressure to the square inch is applied to the piston and cut off at half stroke, the average pressure, during the whole stroke, owing to the expansive quality of the steam,

would be 63½ lbs. or only 11½ lbs. less than the full pressure, although but half the quantity of steam is used, requiring fully ¼ less fuel.

Imagine the diagram to be a cylinder of 3 feet in length, with steam at 60 lbs. pressure, entering the open port. During the first 4 inches of the travel of the piston the steam port is open, permitting the full pressure of the steam to operate on the piston; but at the twelfth inch, marked C, the steam lap on the valve V closes the port. The imprisoned steam will now propel the piston to the end of the stroke, driving out the liberated steam through the port A into the exhaust cavity B, but by the time the piston reaches D, 12 inches from C, the original pressure of 60 lbs. per square inch will have decreased one-half, or to 30 lbs., and when it reaches E, 24 inches from C, it will have still further decreased to 20 lbs. Average pressure 39 lbs. Two-thirds of the stroke have thus been made without any supply of steam from the boiler, and forms the saving due to working the steam expansively. The lack of this contrivance is the true reason why some engines use more fuel and steam, than others of the same capacity and power. It has been stated that the economy of the Corliss cut-off is such that it requires only 2 tons of coal instead of 6¾ tons used by other engines of the same power, but the great trouble with that engine is the liability of the complex and costly valve-gear to get out of order, entailing difficult and expensive repairs.

TABLE.—*Showing the average Pressure of Steam on the cylinder when cut off at ¼, ½ and ¾ of the stroke or travel of the Piston,* commencing with 25 lbs., advancing by 5 lbs. and ending at 100 lbs.

	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
¼	15	17¾	20¾	23¾	26¾	29¾	32¾	35¾	38¾	41¾	44¾	47¾	50¾	53¾	56¾	59¾
½	21	25½	29½	33½	38	42½	46½	50¾	55	59½	63½	67¾	72	76¼	80½	84½
¾	24	28¾	33½	38½	43¼	48¼	53	57¾	62½	67½	72¼	77¼	82	87	91¾	96½

To realize the best results from steam, keep the cylinders, pipes, &c., well covered with good non-conductors. Various materials are used, such as common felting, asbestos felting, hair, old wool, tow or hemp carpets cut up into strips of the proper size and smeared over with a substantial composition of mortar, teased hair, &c., before applying to the pipes. Cover the whole with coarse canvas, finishing with several coats of white lead over the canvas. Some cover boilers with a thickish composition of clay, intermixed with grey or brown paper for a bind, to prevent cracking, &c., the paper being worked up into shreds along with the water and clay. Others use a mixture of mortar, teased hair, &c. Some use asbestos, wood ashes, &c., see "composition for covering boilers." Cylinders should be well clothed and jacketed, and cased with wood or polished metal, the latter when kept constantly bright being a most powerful protection against loss of heat by radiation. Among metals, silver is the best absorbent and conductor of heat. If we call its power of conduction 100, that of copper is 74, gold 53, iron 12, lead 9, bismuth 2.

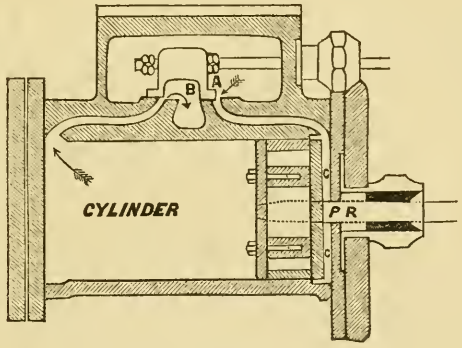
TO SET THE VALVE OF AN ENGINE.—Place the crank at the end of its stroke, and give the valve the proper amount of lead; reverse the crank to the other end of its stroke, and if the valve has the corresponding amount of lead it is correctly set. The preponderance at either end, if any exists, must be equally divided. Be careful in adjusting the nuts attaching the valve to the rod, that they do not impinge against the valves, preventing it from seating true. In adjusting the slide valve to cut off at any point of the travel of the piston, the eccentric should be moved forward in proportion to the amount of lap given to the valve, without any reference to the expansive working of steam, the valve must open at the same point of travel of the piston

TO FIND THE STROKE OF THE VALVE.—Place the crank on the dead

centre, and make a mark on the valve-rod, then reverse the movement to the opposite end and make another mark. The distance between the two marks constitutes the stroke of the valve. The stroke of the valve may be increased as the bearing in the rocker-arm that carries the eccentric hook is lengthened; shorten the same and the stroke is lessened.

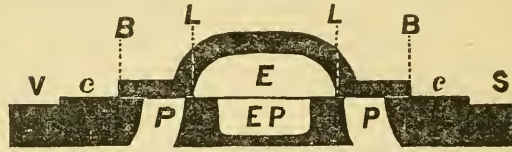
To Find the Throw of the Eccentric.—Measure the eccentric on the heaviest side, then measure on the opposite or light side. The difference between the two measurements will be the throw of the eccentric.

Lead on the Slide Valve.—The lead of a valve is the width of opening which the valve allows to the steam port when the piston is at the end of its stroke, as shown on the diagram at A, which represents *outside lead*, *inside lead*, being shown into the exhaust at B, which ought to be double the amount of outside lead in order to liberate the exhaust easily, and thus reduce or prevent back pressure. Care should be taken not to liberate the exhaust too soon, as it will greatly curtail the power of the engine, especially if the labor is heavy and the speed slow, as in engines with heavy trains on up grades, &c. To ascertain whether the exhaust opens at the right time or not, uncover the steam chest; then uncouple the valve from the valve rod, place a short batten of wood lengthways on the exhaust port; then with a scratch awl lay off lines on the valve seat, on each side of the exhaust port, that will appear above the valve. Next lay the batten on the face of the valve and lay off corresponding lines on the exhaust chamber that will show on the edges of the valve, now replace the valve on its seat, and give 1-32 of an inch lead, and if the lines described on the face of the valve are past the lines described on the valve seat 1-16 of an inch, the exhaust opens at the proper time, if it does not the exhaust chamber in the valve should be enlarged to the right size.



Lead is given to a valve to enable the steam to act as a *cushion* on the piston, by admitting the steam to it previous to the end of its stroke, in order to cause it to reverse its motion easily, without jar or noise, for it is not allowed to touch the top and bottom of cylinder for fear of knocking them out. The space between the top and bottom of the cylinder and the piston, when the latter is at the end of its stroke, is called the *clearance*, shown at C C on diagram. The term clearance is also used to designate the capacity of the connecting steam ports and passages. It is necessary to guard against too much cushion, as it greatly impairs the powers of the engine, causing violent thumping or knocking, and sometimes a serious breakdown. One-eighth of an inch lead is sufficient for an ordinary freight and 1-16 is sufficient for passenger locomotives, the difference being on account of the greater speed of the latter.

LAP ON THE SLIDE VALVE.—The steam lap on the slide valve is the amount by which it extends over the extreme width of the cylinder ports,



as illustrated in the diagram, the distance between the dotted lines B B L L, and the sides of the ports P P, being in each case the lap, the lines B B indicating the outside lap, and L L denoting the inside lap, E P exhaust port, E exhaust cavity in valve. V S valve seat, C C valve face. The emission of steam into the cylinder is regulated by the outer and inner edges of the valve and of the steam ports. When the valve is so contrived that at half stroke the faces of the valve do not cover the steam ports internally, the space by which each face comes short of the inner edges of the ports is known as inside clearance. By means of the steam lap given to the valve the engine is enabled to use its steam expansively, as elsewhere explained.

TABLE.—*Showing the amount of Lap on the Slide valve at various points of cut off; also, the travel of the valve in inches.*

Travel or stroke of the Piston where steam is cut off.

Travel of the Valve in inches.	1/4	1/3	5/12	1/2	7/12	2/3	3/4	10/12
	The correct amount of Lap.							
2	7/8	3/4	11/16	5/8	9/16	1/2	7/16	3/8
2½	1 1/16	1	7/8	13/16	11/16	9/16	1/2	7/16
3	1 1/4	1 3/16	1 1/8	1	15/16	3/4	5/8	9/16
3½	1 1/2	1 5/16	1 3/16	1 1/16	1 1/16	1	7/8	3/4
4	1 3/4	1 9/16	1 7/16	1 5/16	1 1/4	1 1/16	1	13/16
4½	2	1 13/16	1 9/16	1 1/2	1 3/8	1 1/4	1 1/8	7/8
5	2 1/8	2	1 13/16	1 9/16	1 1/2	1 3/8	1 1/4	1
5½	2 5/16	2 3/16	2	1 13/16	1 5/8	1 1/2	1 3/8	1 1/8
6	2 1/2	2 7/16	2 3/16	2	1 13/16	1 5/8	1 1/2	1 3/16
6½	2 3/4	2 9/16	2 7/16	2 3/16	2	1 13/16	1 5/8	1 1/4
7	3	2 11/16	2 9/16	2 3/8	2 3/16	2	1 3/4	1 5/16
7½	3 3/16	3	2 11/16	2 1/2	2 3/8	2 3/16	1 7/8	1 3/8
8	3 5/16	3 3/16	3	2 5/8	2 1/2	2 3/8	2	1 5/8
8½	3 5/8	3 5/16	3 3/16	2 13/16	2 11/16	2 1/2	2 1/8	1 7/8
9	3 13/16	3 5/8	3 5/16	3	2 13/16	2 11/16	2 1/4	1 7/8
9½	4	3 13/16	3 5/8	3 3/16	3	2 13/16	2 3/8	2
10	4 1/4	4	3 13/16	3 5/16	3 3/16	3	2 1/2	2 1/16
10½	4 7/16	4 1/4	4	3 1/2	3 5/16	3 1/8	2 5/8	2 3/16
11	4 9/16	4 7/16	4 1/16	3 5/8	3 1/2	3 3/16	2 3/4	2 1/4
11½	4 13/16	4 9/16	4 7/16	3 7/8	3 5/8	3 3/8	2 7/8	2 3/8
12	5	4 13/16	4 9/16	4 1/8	4	3 5/8	3	2 1/2

Giffard's Injector, as made by Wm. Sellers & Co., is a novel and reliable invention for feeding boilers, economizing the heat and dispensing with pumps. By a simple and well-known combination of 2 pipes, the one conveying steam, the other water, both terminating in a third pipe or tube, a jet of steam from the boiler escaping through an orifice of say 1 inch in diameter, with 60 lbs. pressure, is condensed in perhaps 12 times its weight of water, which it drives through the third tube, causing it to enter the boiler through an orifice much smaller than the one by which it escaped. The momentum of the steam impels the water with great force and imparts all its heat to the water during transmission. The following table shows the maximum temperature of the feed-water admissible during different pressures of steam ;—

Pressure per square inch. - -	10	20	30	40	50	100
Temperature of feed, Fahr. -	148°	130°	130°	124°	120°	110°

To Prevent Incrustation in Boilers.—1. Charcoal has a great affinity for any thing that causes scale or incrustation in boilers. That made from hard wood is the best, broken in lumps of ¼ to ½ inch in size, and the dust sifted out. Two bushels of this will generally protect a boiler of 30 horse-power for 3 weeks when running, after which the old coal should be removed and fresh coal used. 2. Throw into the tank or reservoir from which your boiler is fed, a quantity of rough bark, in the piece, such as tanners use, sufficient to turn the water of a brown color; if you have no tank, put into the boiler from a half to a bushel of ground bark when you blow off, repeat every month, using only half the quantity after the first time. 3. Add a very small quantity of muriate of ammonia, about 1 lb. for every 1500 or 2000 gals. of water evaporated. It will have the effect of softening and disintegrating the carbonate of lime and other impurities deposited by the water during the evaporation. 4. Potatoes and some other vegetable substances introduced into the boiler are most effectual in preventing incrustation, and animal substances, such as refuse skins, are still more so. 5. An English firm put oak sawdust into their boiler in order to stop a leak, and to their surprise it also resulted in preventing incrustation. I should say if oak sawdust could prevent scale in boilers, that there is no visible reason why hemlock and various other kinds of sawdust will not do the same thing. 6. Cow's feet, with the shanks attached, are strongly recommended as a preventive of scale. Two in a large boiler is amply sufficient, and those who wish to do business economically, can get their oil for lubricating purposes cheaply by boiling the feet and shanks for a few hours in a large kettle, setting it aside to cool, and then skimming off the oil from the surface of the water, using the feet for the boiler afterwards. If you wish to get rid of the hair on the shanks, you can get rid of that by using lime, etc., as done by tanners. 7. Sal soda, 40 lbs., gum catechu, 5 lbs., sal ammoniac, 5 lbs., is strongly recommended by an experienced person, for removing boiler scale; 1 lb. of the mixture being added to each barrel of water in the tank; after scale is removed use sal soda alone. By the use of 10 lbs. soda per week, a boiler 26 feet long, and 40 inches in diameter was cleaned from scale equal to a new boiler. 8. A rapid and effectual but not very good plan to scale boilers is to throw in a few wood shavings along the bottom of the boiler and set them on fire; the heat expands the scale more than the shell of the boiler, as the heat cannot reach the latter, the scale is loosened; what remains after this must be removed with a hammer and chisel. 9. Calcareous deposits may be entirely prevented by the use of crude pyroligneous acid combined with tar. It may be either introduced into the boiler or mixed with the feed water in very small quantity; just enough to redden litmus paper; consequently it will never injure the boiler. 10. It is on record that the engineer of the French ocean steamer, St. Laurent, omitted to remove a bar of zinc when repairing or cleaning out his boilers. On opening them at the end of the voyage, to his great surprise he found that the zinc

had disappeared, that his boilers were entirely free from scale, and the boiler plates uninjured.

Average Proportion of Various Parts of Engines.—*Steam Pipe* should be ¼ the diameter of cylinder, but varies on large engines. *Exhaust Pipe* should be ⅛ the diameter of cylinder. *Piston Rod* should be ⅛ the diameter of cylinder if of iron, and smaller if of steel. For high speeds, steel piston rods are the best. *Steam Ports* vary according to speeds, from 1-16 to 1-10 the area of piston. *Safety Valves* should possess an area of ½ square in. of surface for every foot of grate surface, and should be constructed with loose vibratory stems, for the reason that they are not so liable to get out of order as those with rigid stems.

Rule for Size of Cylinder.—The requisite diameter of cylinder for a 25-horse beam engine is 28 inches, and about 5 feet stroke. The nominal horse-power of any sized cylinder can be found by the following formulæ: —For low pressure or beam engines, divide the area of cylinder by 25, which will give the number of horse-power. For high pressure horizontal engines, divide the area of cylinder's diameter by 12·5, which will give the number of horse-power, including all friction.

Stroke of Engines.—The stroke of an engine varies according to circumstances, which the designer must take into consideration ; but the general rule is to make the stroke about twice the diameter of the cylinder. The diameter of the fly wheel should be about 4 times the stroke of the engine, and the rim should weigh about 3 cwt. per horse-power.

Rule to Find the Horse-Power of Stationary Engines.—Multiply the area of the piston by the average pressure in lbs. per square inch. Multiply this product by the travel of the piston in feet per minute ; divide by 33,000, this will give the horse-power.—*Roper.*

Example :

Diameter of cylinder	12
	12
	144
	7854
Area of piston .	113,0976
Pressure, 70 ; Average pressure, 50	50
	5654.880
Travel of piston in feet per min.	300
	33,000)1696464.000
	51. horse-power.

Horse-power (indicated) required for different processes.

Blast Furnace	60	Railway rolling train	250
Refining "	26	Small bar train	60
Puddling Rolls with squeezers and shears	80	Double rail saw	12
		Straightening	7

Balance Wheels.—Every balance wheel should be speeded up so as to run twice or three times as fast as the crank shaft it is intended to balance. When a balance wheel is applied in this way it makes the machine run a great deal more steadily, for, when the balance wheel is geared into the crank shaft, and runs two or three times faster than the crank shaft, it forms a power of itself when going over the centre, which propels the crank shaft until it reaches the quarter, where it again takes its power from the

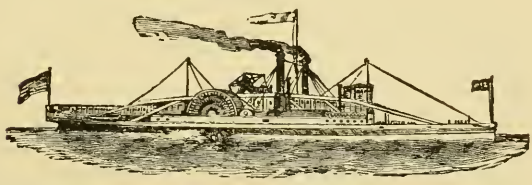
machine. Although it takes an additional shaft and gears to apply a balance wheel in this way, the saving of metal in the balance wheel fully compensates for the extra labor; for, when a balance wheel is speeded three times as fast as the crank shaft, it needs only one-third of the metal in it that it would were it not speeded up at all, and if balance wheels were applied in this way generally it would make all engines run far more steadily.

To Reverse an Engine.—Make a legible mark on the eccentric near the shaft, make a similar mark on the shaft at the same place. Now place one point of the callipers on the mark made on the shaft, and with the other point ascertain the centre of the shaft on the opposite side, making another mark there also. Next unscrew the eccentric and move it in the direction in which you wish the engine to run, until the mark on the eccentric comes into line with the second mark on the shaft, then screw the eccentric fast and the engine will run the reverse way.

Rule to Find the Weight Necessary to put on a Lever when the area of Valve, Lever, &c., are Known.—Multiply the area of valve by the pressure in pounds per square inch; multiply this product by the distance of the lever from the fulcrum; multiply the weight of lever by one-half its length (or its centre of gravity); then multiply the weight of valve and stem by their distance from the fulcrum; and these last two products together, and subtract their sum from the first product, and divide the remainder by the length of lever; the quotient will be the weight of the ball.—*Roper.*

Example:

Area of valve 7 sq. in. .	60 lbs.	9 lbs. .	6 lbs.
Pressure . . 60 lbs. .	7 in.	12 in.	3 in.
	420 lbs.	108 lbs.	18 lbs.
Fulcrum 3 in.	3 in.	18 lbs.	
	1260	126 lbs.	
Length of lever 24 in. .	126 lbs.		
	24) 1134 lbs.		
Weight of lever 9 lbs.	47.25 lbs. weight of ball.		
Weight of valve and stem 6 lbs.			



Marine Engines.—*Duties to machinery when in Harbor before getting under Steam, by a Practical Engineer.* When an engineer takes charge of the machinery of a boat his first attention ought to be directed to his boilers; for, being the source of power, they may become the source of great danger if not properly looked after. In inspecting the boilers, three things require special attention. 1. The thickness of the plates above the fires and other places of importance. 2. The state of the stays. 3. The position of the gauges, viz.: the water gauge, cocks, and glass water gauges. Respecting the first, a general plan is to drill a small hole through the plate, and thus find its real thickness, for it is often the case that a boiler plate may

be far thicker at the seams than in the middle. At the seams the proper thickness cannot always be correctly ascertained on account of the way in which they are caulked by which a plate may appear considerably thicker than it really is. After the hole has served its purpose, it is tapped and packed tightly up again.

As regards the stays, they require a great amount of attention ; for they are very apt to get eaten through, near the plates, by oxidation. The gauge cocks are often placed just above the highest row of tubes. Now this is a very dangerous practice, for it is possible for an engineer to lose his water, let him be ever so careful, when great danger follows ; while if the cocks were placed a little higher, the loss of water would not be attended by so much danger.

Duties to Machinery when Steam is getting up.—The water in the boiler, when the fires are lighted, ought to be just above the bottom of the glass. In a large or even moderate sized boiler, the water will expand, and there is also not so much water to heat at first ; and we know, by reason of conduction and radiation, that small bodies of water are heated comparatively more rapidly than larger. On first lighting the fires they should not be kept too large, but just sufficient to cover the bars. A large thin surface of fire is found to be the most effective in getting under way. When the fires are lighted, and the steamer is going on a long voyage, it is the practice to rub the polished parts of the engine over with a composition of tallow and white lead. This prevents any rust forming on the rods, etc., from water dropping on them which may have been used for keeping the bearings cool.

The discharge valve is also opened now, or else on starting the engine something will give way. Several accidents have occurred by neglecting to do this.

The safety valves are now to be inspected to find whether they are fast or corroded to their seatings. If so, they must be freed and made ready to act before starting.

It is a good plan and one much practiced, to give the engines a good blowing through whilst the steam is getting up. This warms the cylinder and tries any joints that may have been made since the engines were worked last. It also saves the steam, for if not done now (when the engine is starting) a great amount of steam is wasted in heating the cylinder, instead of imparting its elastic force to the piston.

Starting the Engines.—All steamships are now fitted with the double eccentrics of "Stephenson's Link Motion," by which the engines are started, or rather by this the slide valves are under the control of the engineer, and can be worked back or forward as command is given, by either a bar, lever, or generally, in large engines, by a wheel.

The handles, by which steam is turned on and off, with the injection cock handles, are placed beside the wheel, so that one man can now generally start the engine.

Some large ships have a steam piston so fitted that it rises and falls by steam admitted above or below, thus raising or lowering the link in its motion. This is what is called steam starting gear, and is very handy when the link is of great weight. There is always hand gear fitted as well, which can be used in cases of emergency. In giving injection to a common condenser, it should be opened just after the steam is turned on to the cylinders, or else if going slowly the condenser may become too full of water, and the air pump not able to perform its work properly.

In starting an engine that is fitted with surface condensers, the only thing requiring attention before going on, is to open both valves communicating with the sea above or below the condenser, viz. : suction to the circulating pumps and delivery from them.

Duties when under Steam.—Always keep looking at the water level. This is sometimes a source of great anxiety, for some boilers require the water to be kept at a certain fixed level. If water be too high they will not keep steam, and if too low the steam will generate too fast. Some boilers require

a high water level; nothing but practice can determine it. A safe rule is to keep the glass gauge about two-thirds full. Blowing out marine boilers should be practiced every two or three hours. Practice has proved this to be a good rule, on account of not so much water being required to be blown out at a time, and therefore the steam pressure is not reduced to a very great extent.

In steamers fitted with surface condensers, a little sea water is supplied to the boiler to make up for the loss in the steam pipes, jackets, caps, in the condensers, etc. This in time may injure the boiler if not counterbalanced some way or other. The general rule is to blow out about two or three inches every twelve hours. The water in these boilers is never allowed to reach more than 2-30 of saltness.

The fires require much consideration. A furnace is best worked with a heavy fire, but not too heavy, thicker towards the back than front. The fresh fuel should be placed in front, and then pushed back after being thoroughly heated. Every four hours (at the least) the fires should be cleaned out, as large clinkers or refuse of the coals adhere to the fire bars and prevent the draught, making the fires burn dead, especially towards the back of the furnace. Sometimes the slag will stick fast to a furnace bar, and cannot be removed from it. This causes a great amount of trouble, as in trying to remove it, the fire bars are occasionally pulled out of their places, and the greater part of the fire falls through, causing much waste and often danger.

The principal thing to pay attention to when the engines are under steam, is to keep the bearings cool and the glands steam tight. Oil is generally used for keeping bearings cool, but when larger ones are working hard, a jet of water is kept playing on them. This is found to answer very well when the water is turned on before they have had time to heat. It should not be used after they have been allowed to get heated, for it may crack them by too sudden contraction. A good stream of water should be kept running on the thrust block from the time of starting, this with the tallow, which is always put into it before starting, keeps this all-important bearing cool. The cap of the thrust block requires great care in adjusting. If screwed on too tightly it is almost sure to heat, or fire as it is termed, and if not screwed down sufficiently tight the unpleasant jumping shake so often experienced in our screw ships is sure to follow. The packing of the gland at the stern tube should be well looked after, and kept quite tight and well tallowed.

In paddle-wheel steamers there is frequently not sufficient care taken about the outer bearings of the shafts. In very few ships are proper means provided for lubricating these important parts. At the commencement of a voyage, the outer bearings are well tallowed, and often put down, screwed up, and left to look after themselves as best they may. Very few ships, indeed, being provided with tubes leading down from the paddle-boxes to the oil holes of the blocks, or in which means are provided for their lubrication.

The coals in the bunkers must be carefully watched, to prevent spontaneous combustion. The stoppers over the holes should be kept open as much as possible, and care taken not to keep damp coals longer in the bunkers than can be avoided; for it is only damp coal that is liable to spontaneous combustion.

In new fast-running engines, castor oil is a very good thing to use on first starting. When new brasses have been fitted into the bearings, till they form a good bearing for themselves, the same should be used. It appears to have a much finer body in it to lubricate than other oils have. The difference in the cost of the oil is not very much, coarse castor oil being very little dearer than good machine oil.

Duties to Machinery when the Ship has arrived in Port.—The white lead and tallow should be rubbed off with a piece of oily waste, and then the bright work of the engines will give no trouble by rusting. The engines should

have a good blowing through to drive out all water in the condensers, then the Kingston's valves, communicating with the sea, should be shut, next open the condenser drain cocks, which let out all water left in them. This is allowed to run into the bilges, which can be pumped out by the donkey pump, or the hand pump if no steam is left in the boilers.

Some engineers always blow out their boilers after steaming, others do not, the latter only let the fires out and shut the valves in the steam pipes; both plans have their advantages and disadvantages. Perhaps the majority keep the water in the boilers, only blowing out when repairs or an examination of the boiler is required. An engineer should always examine for himself, whether all the fires are properly out, and not take the word of the stokers for it. A great amount of damage may be done by the fire not being properly put out in the ash pits. A frequent practice is to get a heap of hot ashes together and dash some water over it. This makes it black outside and leaves it burning inside. The ashes should rather be spread out evenly, and the water thrown over gradually and gently, to put out the fire effectually, and to create as little dirt and dust as possible.

Engineers' Bell Signals in Use on Steamers.—*Go ahead*, 1 stroke; *Back*, 2 strokes; *Stop*, 1 stroke; *Slowly*, 2 short strokes; *Full Speed*, 3 short strokes; *Go ahead Slowly*, 1 long and 2 short strokes; *Back Slowly*, 2 long and 2 short strokes; *Go ahead Full Speed*, 1 long and 3 short strokes; *Back Fast*, 2 long and 3 short strokes; *Hurry*, 3 short strokes repeated.

To find the amount of Lap on the Slide Valves (before setting the slides). Take a batten of wood, and place it on the cylinder slide face at right angles to and over the ports. Mark off on it the edges of the steam and exhaust ports with a square and scriber. By placing this on the face of the slide valve, the amount of lap can at once be found.

To Set the slides.—Put the piston at the top or bottom of its stroke. If the eccentric is rightly fixed on the shaft, simply fasten the slide valve on the spindle with the required amount of lead. Then turn the engine to the other end of its stroke, and see if the lead is the same; or in some engines more lead is given at the bottom than at the top (as in vertical engines). If the engine is fitted with the link motion, the reversing eccentric is then connected and the valve tested in like manner. Also with the link motion, the slide rod is placed in the centre of the link; and although the position of the eccentrics on the shaft ought to destroy any motion of the valve, yet there is a little with a short link. This is tested to see that the steam ports are always closed and thus the engines can be stopped, even if the full pressure of steam be admitted to the back of the slide by the stop or throttle valves.

Steam Fire Engines are or should be constructed with steel boilers and blast tubes, copper tubes and large water spaces, together with a good fit out of gauges, safety valves, injectors, &c., with facility of getting up steam in from 6 to 10 minutes from cold water, and in about 5 minutes from water at 130°. These machines as now constructed are of great elegance and power, some of them having projected a continuous, solid stream of water over 300 feet, through 100 feet of hose, fitted with 1½ inch nozzle. Steam pressure about 80 lbs. per square inch. The principle is that of a steam pump, being fitted with the usual air chamber to induce a continual stream.

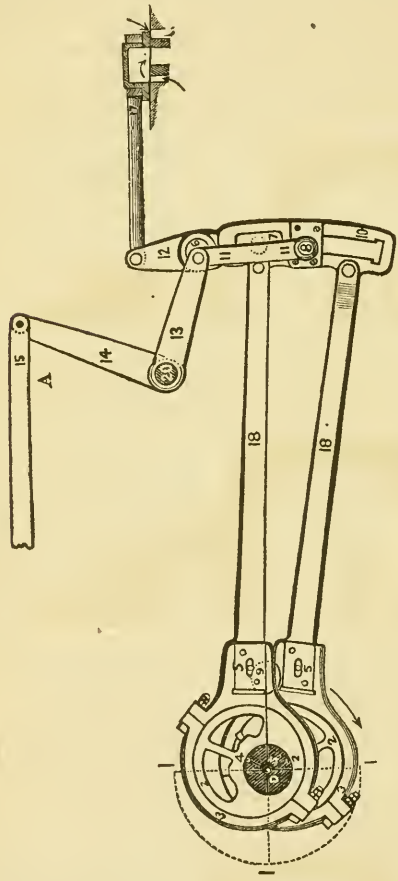
Portable Engines are constructed as light as possible, consistent with proper strength of parts, in order to render them available for easy transportation. Sometimes they are mounted on wheels, and are in quite extensive use for driving light saw-mills, threshing, brick-making, pumping, chaff-cutting, &c.

Instructions to Engineers and Firemen on Locomotives.—Keep the fire evenly and uniformly spread over the grate without elevations or depressions. Fire from large coal, as it leaves wider openings between the lumps for the admission of air, may be deeper than when the coal is small and lies close together. Remove all incombustible material

and clinkers from the furnace as soon as possible, they prevent the draught from producing proper results. The bulk of fuel on the grate should always be in proportion to the quantity of fuel consumed. The dampers in the front and rear of the ash-pan regulate the draught admitted to the furnace, and require very careful attention, as the stream of air issues with a velocity of 72 ft. per second when the dampers are open and train under full headway. At a speed of 60 miles per hour the pressure of the current of air amounts to 9 lbs. on every square foot. One ton of bituminous coal requires 300,000 cubic feet of air for its combustion, of which 100,000 is required to consume the gases evolved from it. Anthracite coal requires 310,480 cubic feet of air per ton for its combustion. It burns without smoke, requires a good supply of oxygen and intense heat to burn it, but makes a very fierce fire. Good practice requires complete combustion of the carbon and hydrogen available in the fuel; insufficient air causes a dense black smoke to issue from the chimney, and the loss of heating effect, and too much air, lowers the temperature of the flame and dissipates the heat. Of good coal, 62.2 per cent. go to form steam, and 1 lb. will in good practice evaporate 7½ lbs. of water. In practice the greatest evaporative power of 1 lb. of coke is 9½ lbs. of water, in common practice it is 8½ lbs. and 78 per cent. of its products go to form stream, 22 per cent. being lost by products of combustion, ashes, etc. The heating power of coke as compared with that of coal is in the proportion of about 14: 12. The temperature produced by the combustion of coke in the hottest part of the fire box, may be estimated at 1666° Centigrade. The temperature produced by wood is usually less than 1111° Centigrade (100° Centigrade is equivalent to 212° Fahr.). The proper combustion of coal requires the admission of air both through and above the grate, the right proportion depending upon the percentage of the gaseous components in the coal: In the combustion of coke the air may be admitted through the grate only, 1 lb. of coke requiring about 200 cubic feet of air. For receiving the best effects from the fuel, the emission of the gases from the furnace should be retarded, in order to promote complete combustion under high temperature, for this reason the grate surface should be as large as possible to induce a slower current, and the weight of the steam exhausted and the air inhaled should be in every case the same. For the prevention of smoke, engineers usually rely on the damper, the ash-pan and the fire door, with careful stoking. They endeavor to prevent the formation of smoke by controlling the admission of air through the grate, adjusting it exactly to the demands of the fuel, also by the fire door for the admission of air above the fuel, by firing with large pieces of coal, and deep fires for heavy duty, and smaller coals with shallow fires for lighter duty, by firing more frequently to lighten the duty, and at all times by keeping the bars covered with fuel to prevent excessive local draughts through the grate. Fresh coal should be thrown on under the fire door directly inside, and, when partly burned, pushed forward towards the tubes; but when the grates are inclined, it will work downwards by gravitation. Never fill a *hot boiler* with *cold water*, and always allow it to cool off before running the water out; never blow out a boiler while hot, under any circumstances, as the heated plates will be sure to bake the deposits of mud into a compact scale of great tenacity; if allowed to cool, these deposits will settle down in a soft mass easily swept out with a hose and water. Frequent duty should be made of washing out all deposits of foreign matter from the barrel of the boiler, the tubes, and from the crown sheets between the crown bars, especially while using bad water, and after heavy rains; and screw-plugs, made of hard brass, should be fitted to every boiler near the sides of the fire box, to permit the use of a hose with water for this purpose.

To avert danger from intense heat, to save fuel, and keep up a free circulation, engineers should adjust the injector so that the boiler will lose a little water while running between stations, if the injector is kept at work during stoppages, this loss will be compensated, and a full supply always

kept up, absorbing the surplus heat and preventing explosion. Incessant watchfulness is necessary to look out for impending danger in every possible direction, and no engine driver, while on duty, should relax his energy, care, caution, watchfulness, decision, and presence of mind for a single moment. If vigilance and endurance were ever necessary in any business or calling, most certainly they are of paramount importance in this above all others. See that the safety valves are properly acting, and that the



The Double Eccentric, Link, and Valve Motion.

PARTS NEXT DRIVING AXLE, OR CRANK SHAFT, (D S) 1 1 shows the positions of the Crank at full and half stroke. 2 2 Eccentrics. 3 3 Eccentric straps. 4 2 Angular Advance. 5 5 Stub ends of eccentric rods. 9 Crank pin. 18 18 Eccentrics. PARTS NEXT LINK.—6 Rocker shaft. 7 Link block. 8 Saddle or Link pin. 10 Link. 11 11 Lifting link. 12 Outside rocker. 13 Lifting arm. 14 Reverse arm. 15 Lever or reachrod connected with the quadrant or sector in the Cab. 17 Rod working side valve. 18 18 Eccentric rods. 20 Reverse shaft. If the reverse-arm, 14, is drawn towards A, by the lever or reachrod controlled by the engineer, the link will be elevated to the block, which will change the position of the valve, and reverse the engine.

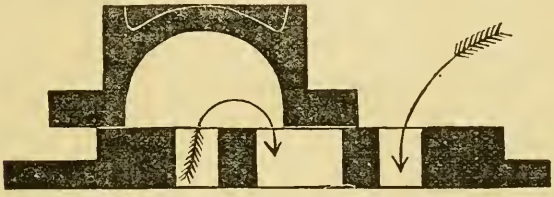
indications of the steam gauge are correct. In experiments made with a locomotive boiler, the fire being kept regular, and the engine, at rest, in 9 minutes the pressure increased from 32 lbs. to 74⅜ lbs. per square inch, being much more than double, a most surprising increase, and one which will enable us to account for many explosions which have happened while engines were at rest.

Pay the closest attention to the cylinder and piston rod packing, and exercise judgment and care in selecting the best kinds and also in

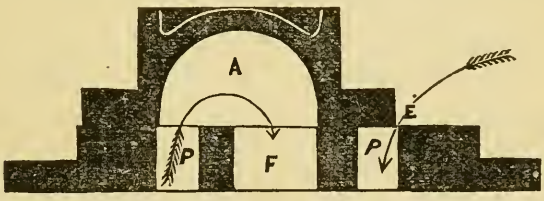
applying them when selected. Use due precaution against making mistakes either in packing too tight or too loose, as each extreme in its degree is productive of much mischief, waste, and loss of power. It requires the exercise of considerable intelligence and care to make the best possible adjustment of either spring or steam packing.

Equal vigilance is necessary in guarding against incrustation and scale in boilers. In order to raise steam to a pressure of 120 lbs. to the square inch, a very common pressure in locomotive boilers, the water must be heated to a temperature of 345°. This involves a high temperature in the furnace plates and other parts of the boiler, imposing a very severe duty at any time, but doubly destructive in the event of the existence of incrustation or scale.

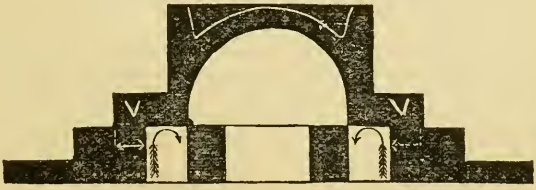
The annexed figures are inserted with a view to render assistance in adjusting the valves of locomotives. The first diagram represents the



position of the valve as it should be when at half stroke. The second figure indicates the proper position of the valve when at the end of its stroke with the crank at the dead centre. A represents exhaust cavity



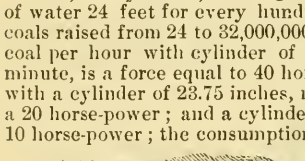
in valve. F ditto in valve seat. P P steam ports. E lead. The third cut represents the position of the valve when the line is exactly under the saddle-pin and the reverse latch in the outer notch in the quadrant or sector. V V shows the lap. *Full steam* is the position of the valve when fully open, and the engine in motion. *Cut-off* is the position of the valve when it has just closed the port against the admission of steam. *Angular Advance* is the angular measurement of the arc described by the centre of the eccentric while passing from the place it occupies when the valve is at half stroke, to that which it occupies at the commencement of the stroke of the piston.



Linear Advance is the distance which the valve moves while the centre of the eccentric is describing the above angle. See diagram of *Eccentric, Link and valve motion.* A majority of railways allow for the *travel of valves, on Express Passenger Engines,* 5 inches, for outside lap, $\frac{7}{8}$ inch, for inside lap, $\frac{1}{8}$ inch, for lead in full gear, 1-10 inch. *On Express Accommodation Engines,* for travel of valve, 5 inches, for outside lap, $\frac{3}{4}$ inch, for inside lap, $\frac{1}{8}$ inch, for lead in full gear, 1-10 inch. *On Heavy Freight Engines,* for travel of valve, 5 inches, for outside lap, $\frac{5}{8}$ inch, for inside lap 1-16 inch, for lead in full gear 1-16 inch.

Power of Engines.—Horse-power in steam engines is calculated as the power which would raise 33,000 lbs. a foot high in a minute, or 90 lbs. at the rate of 4 miles an hour. One-horse power is equal to the lifting, by a pump, of 250 hogsheads of water ten feet in an hour. Or it would drive 100 spindles of cotton yarn twist, or 500 spindles of No. 48 mule yarn, or 1000 of No. 110, or 12 power looms. One horse power is produced by 19 lbs. of Newcastle coals, 50 lbs. of wood, or 34 lbs. of culm. Coals 1, wood 3, and culm 2, give equal heats in the production of steam.

Sixteen lbs. of Newcastle coal converts 100 lbs. of water into steam. A bushel of coal per hour raises steam to 15 lbs. the square inch, whose velocity is 1350 feet per second, and 2 bushels raise it to 120 lbs., or velocity of 3800 feet per second. A horse-power requires from 5 to 7 gallons of water per minute for condensation of steam. A steam engine whose cylinder is 31 inches, with 17 double strokes per minute, performs the constant work of 40 horses with 5 tons of coal per day. One of 19 inches and 25 strokes, of $1\frac{1}{2}$ horses, with $1\frac{1}{4}$ tons per day. They raise 20,000 cubic feet of water 24 feet for every hundredweight of coals. One bushel of good coals raised from 24 to 32,000,000 lbs. one foot per minute. Four bushels of coal per hour with cylinder of $31\frac{1}{2}$ inches and $17\frac{1}{2}$ strokes of 7 feet per minute, is a force equal to 40 horses constantly. A rotative double engine, with a cylinder of 23.75 inches, making 21.5 strokes of 5 feet per minute, is a 20 horse-power; and a cylinder of 17.5 making 25 strokes of 4 feet, is a 10 horse-power; the consumption of coals being proportional.



Proportion of Locomotive Boilers, &c.—Boiler sheets, best cold blast charcoal iron $\frac{3}{8}$ in. thick, or best cast steel 5-16 in., double rivets along horizontal seams and junction of fire box to be double riveted. *Waist* formed of 2 sheets rolled in the direction of the fibre of the iron or steel. One longitudinal seam in each, above the water line to be double rivetted. All iron sheets $\frac{3}{8}$ in. thick, rivetted with $\frac{5}{8}$ inch rivets placed 2 inches from centre to centre. Steel plates 5-16 in. thick rivetted with $\frac{5}{8}$ inch rivets, placed $1\frac{7}{8}$ inch from centre to centre. Extra welt pieces, rivetted to side of side sheets, giving double thickness of metal for stud bolts and expansion braces. *Furnace Plates,*—if of iron, 5-16 inch, if of copper $\frac{1}{4}$ in., if of steel, crown sheets, $\frac{3}{8}$ in., side and back sheets (steel) 5-16 in., flue sheets (steel) $\frac{1}{2}$ in., water space, 3 ins., sides and back, 4 ins. front. *Stay Bolts,* $\frac{7}{8}$ in. diam. screwed and rivetted to sheets, $4\frac{1}{2}$ in. from centre to centre. *Crown Bars,* made of 2 pieces of wrought iron, $4\frac{1}{2}$ in. by $\frac{5}{8}$ in., set $1\frac{1}{2}$ in. from centre to centre, and secured by bolts fitted to taper holes in crown-sheets, with head on under side of bolt nut on top, bearing on crown bar. *Crown Sheets* braced to dome, and outside shell. *Furnace Door* opening formed by hanging and rivetting together the outer and inner sheets. *Tubes,* 11 feet long, and 2 in. diam. set in vertical rows $\frac{3}{4}$ of an inch apart, give the best results. *Grate Bars,* for burning wood or soft coal, should have $\frac{1}{2}$ in. openings. *Smoke Stack* for wood burning engines should have the "bonnet stack," from 5 to $5\frac{1}{2}$ ft. diam. at top, with wire netting; for engines burning soft coal, a much smaller area of cone is required; but for engines burning anthracite coal, use a plain open stack without cone or netting. *Safety Valves.* Every

locomotive should be provided with two safety valves fitted to brass seats, and secured by springs of sufficient elasticity to allow a lift of the valve adequate to permit the emission of all the steam the boiler will generate after it exceeds the maximum pressure. The bearing or mitre on the valve face should not exceed $\frac{3}{8}$ in. *Mud Plugs* should be provided on the side of the shell on a level with the crown sheet. To avoid weakening the boiler, rivet a welt on the inside of the shell in the line of the holes. *Steam Room*, 6 to 7 cubic feet per square ft. of growth surface. Good work has been obtained from boilers possessing 1 cubic foot of steam room to 1 square foot of water surface, and a water surface 1-13 that of heating surface.

Average Proportion of the Various Parts of Locomotives.—*Cylinders* of locomotives vary in size, ranging all the way from 8 in. up to 20 in. diam. *Crank Pin* should be $\frac{1}{4}$ the diam. of cylinder. *Valve Stems* should be 1-10 the diam. of cylinder. *Piston Rods* should be $\frac{1}{6}$ the diam. of cylinder. *Pump Plunger* should 1-9 the diam. of cylinder. *Main Steam Pipe.* Area should be from $\frac{1}{8}$ to $\frac{1}{4}$ the diam. of cylinder. *Steam Ports.* Area should be 1-12 the area of cylinder. *Exhaust Port.* Area should be equal to $\frac{1}{6}$ the area of cylinder. The *width of bridges* for different sized cylinders of locomotives vary from $\frac{5}{8}$ to $1\frac{1}{4}$ inches. *Chimney.* Height should not exceed 14 ft., diameter a little less than the diam. of cylinder. *Diam. of Boilers* vary from 3 ft. to 4 ft. 3 in. *Tubes* vary in number from 100 to 220, top row should be 8 inches under water. *Heating surface.* Total should be from 1000 to 1500 square ft. *Fire Grate Surface* ranges from 12 to 30 sq. ft., usual rule 15 sq. ft., with about 90 sq. ft. of heating surface in fire box. *Evaporative Power* should range from 100 to 200 cubic ft. of water per hour. *Proportion of heating surface to each sq. foot of grate*, should be from 68 to 80 feet. *Petticoat Pipe* should be $\frac{2}{3}$ the diam. of the inside pipe of the stack. *Ash Pans*, should be 9 inches below bottom of grate for wood burning engines, 10 in. for soft coal, and 12 to 14 in. for anthracite coal burners, and should be as nearly air tight as possible when dampers are shut. *Dampers*, should when shut stand at an angle of 35° from perpendicular. *Smoke Box*, diam. should equal diam. of boiler, length from flue sheet to inside of front door $1\frac{1}{4}$ times the length of the stroke of the engine. *Tires*, when new $2\frac{1}{2}$ to $5\frac{5}{8}$ in. thick, must not be worn down to less than $1\frac{1}{4}$ to $1\frac{1}{2}$ in. Wrought iron tires wear about 1-12 of an inch per annum.

Rule to find the Horse-Power of a Locomotive.—Multiply the area of the piston by the pressure per square inch, which should be taken as $\frac{2}{3}$ of the boiler pressure; multiply this product by the number of revolutions per minute. Multiply this by twice the length of the stroke in feet or inches; if in inches they must be divided by 12), multiply this product by 2 and divide by 33,000; the result will be the power of the locomotive.—*Roper.*

Example:

Cylinder	19 inches
Stroke	24 "
Diameter of Drivers . . .	54 "
Running Speed, 20 miles per hour.	
Area of piston, 283.5 square inches.	
Boiler pressure, 130 lbs. per square inch	
Maximum pressure in cylinders, 80 lbs.	

$$\frac{283.5\times80\times4\times124\times2}{33{,}000} = 681.6 \text{ horse-power.}$$

Fire Cement.—Fire clay, wet, 100 parts, white lead, 3 parts, powdered asbestos, $\frac{1}{2}$ part, mix all together and use as mortar.

Railway Train Speed Table.—A train going 1 mile an hour travels one and seven-fifteenths—say one and a half foot per second. To form a table of speed from these data is a mere matter of multiplication. Example:—A train going 70 miles an hour travels per second 1 and 7-15 ft. multi plied by 70=102 and two-thirds feet.

CEMENT FOR STEAM-PIPE JOINTS, ETC., WITH FACED FLANGES.—White lead, mixed, 2 parts; red lead, dry, 1 part; grind, or otherwise mix them to the consistence of thin putty; apply interposed layers with 1 or 2 thicknesses of canvas, or gauze wire, as the necessity of the case may be.

SOFT CEMENT FOR STEAM-BOILERS, STEAM-PIPES, ETC.—Red or white lead, in oil, 4 parts; iron borings, 2 to 3 parts.

HARD CEMENT.—Iron borings and salt water, and a small quantity of sal-ammoniac, with fresh water.

APPLICATION FOR BURNS AND SCALDS.—The following has been tested in the severest cases of burning and scalding from railway and steamboat accidents. Glycerine, 5 oz.; white of egg, 4 oz.; tinct. of arnica, 3 oz.; mix the glycerine and white of egg thoroughly in a mortar and gradually add the arnica. Apply freely on linen rags night and morning, previously washing with warm castile soap suds. In urgent cases, if nothing better can be had, clap on a mud poultice, a favorite and very effectual remedy with school boys who are stung while making war on hornets' nests.

BLOWING ENGINES FOR SMELTING.—The volume of oxygen in air is different, at different temperatures. Thus dry air at 57°, contains 10 per cent. less oxygen than when it is at the temperature of 32° and when it is saturated with vapor it contains 12 per cent. less. If an average supply of 1500 cubic feet per minute is required in winter 6150 feet will be required in summer. In the manufacture of *Pig iron* with *Coke or Anthracite coal*, 18 to 20 tons of air are required for each ton; with *Charcoal*, 17 to 18 tons are required for each ton (1 ton of air at 340° = 29,751, and at 60° = 31,366 *cubic feet*). The *Pressure* ordinarily required for smelting purposes is equal to a column of mercury from 3 to 7 inches. The capacity of the *Reservoir*, if dry, should be 15 times that of the cylinder, if single acting, and 10 times if double acting. The area of the *Pipes* leading to the reservoir should be .2 that of the blast cylinder, and the velocity of the air should not exceed 35 feet per second. A ton of pig iron requires for its reduction from the ore 310,000 cubic feet of air, or 5.3 cubic feet of air for each pound of carbon consumed. Pressure, 7 lbs. per square inch. An ordinary eccentric fan, 4 feet in diameter with 5 blades 10 inches wide, and 4 inches in length, set 1 9-16 inches eccentric, with an inlet opening of 17.5 inches in diameter, and an outlet of 12 inches square, making 870 revolutions per minute, will supply air to 40 tuyeres, each of 1⅝ inches in diameter, and at a pressure per square inch of .5 inch of mercury. An ordinary eccentric fan blower, 50 inches in diameter, running at 1000 revolutions per minute will give a pressure of 15 inches of water and require for its operation a power of 12 horses. Area of tuyere discharge 500 square inches. A non-condensing engine, diameter of cylinder 8 inches, stroke of piston 1 foot, pressure of steam, 18 lbs. (mercurial gauge), and making 100 revolutions per minute will drive a fan, 4 feet by 2, opening 2 feet by 2, 500 revolutions per minute. The width and length of the *blades* should be at least equal to ¼ or ⅓ the radius of the fan. The *inlet* should be equal to the radius of the fan; and the outlet, or discharge, should be in depth no less than ⅓ the diameter, its width being equal to the width of the fan. When the pressure of a blast exceeds .7 inch of mercury per square inch, .2 will be a better proportion for the width and length of the fan than that above given. The *pressure* or density of a blast is usually measured in inches of mercury, a pressure of 1 lb. per square inch at 60°=20.376 inches. When water is used as the element of measure, a pressure of 1 lb.=27.671 inches. The eccentricity of a fan should be 1. of its diameter. A *Smith's forge* requires 150 cubic feet of air per minute. Pressure of blast ¼ to 2 lbs. per square inch, 1 ton of iron melted per hour in a cupola, requires 3500 cubic feet of air per minute. A *finery forge* requires 100,000 cubic feet of air for each ton of iron refined. A *blast furnace* requires 20 cubic feet per minute, for each cubic yard, capacity of furnace.

On Saw-Mills.—To Get the Most Lumber from Saw-Logs.—Experience has abundantly proved to our satisfaction that this can be done only by the use of the circular saw. Some parties are in favor of the Mulay saw. Human ingenuity has been so prolific in the invention and construction of this kind of machinery, that the principal difficulty with the intended purchaser seems to be an inability to decide whose machine is really the best. Every builder or inventor appears to claim for his machine such a perfect constellation of valuable features, that a certain amount of hesitation in coming to a decision seems to be inevitable. In the stationary form of saw mills, the saws are arranged either single or in gangs. Some of the portable kind (circular saw mills) have an upper saw to complete the cut made but partially through large logs by the lower saw. See diagram. By the single movement of a lever, the head-blocks on which the log rests, are simultaneously moved up, moving the log a distance nearer the saw, adequate to the thickness of board desired, with an overplus the width of the cut made by the saw. By moving another lever, a pinion meshing into a rack beneath the log-carriage is made to impel the log against the saw, and run the log backwards after the board is cut. These movements, on the best constructed machines, are made with surprising velocity, some of them being accredited with having cut over 60,000 feet of lumber in one day.

Occasionally we listen to a great deal of rant regarding the beatitudes of "the good old times," during the lives of our forefathers. These times proved very disastrous to the enterprising Dutchman, who, in 1663 started the first saw-mill in England, which he was finally obliged to abandon, and fly to save his life. In 1767 another saw-mill, at Lime-house, near London, was demolished by a mob of sawyers, who considered that their business would be ruined to a dead certainty if things were allowed to go on.

The old method of manufacturing lumber and dimension stuff by ripping logs lengthways on the sawpit, is still fresh in the remembrance of many. One man mounted the log and pushed the saw downwards and pulled it upwards, assisted by another man in the pit below, with a veil over his face to keep the sawdust out of his eyes. We hail with gratitude the modern improvements which enable us to dispense with every such form of labor.

Having tried the up and down saw and the circular saw also, we would again repeat our conviction that the last mentioned is the best for manufacturing lumber, and should any person act on this expression of opinion, let them in the first place be very careful to get, if possible, the best machine, bring it to the mill, and set it perfectly level and true. When you get it in operation, see that you handle it carefully. If you have been used to running the up and down saw only, you will soon find out that your former experience avails almost nothing in the management of the rotary machine; but when you get the hang of running it, the compensation in the way of convenience, rapidity, and quantity of work is immense. Some prefer to use the inserted tooth saws, and will use no other. They seem to possess many advantages, and are entirely safe. A late invention of *spreading* the *upper part* of the tooth *towards the point* during the process of manufacture, spreading it out so as to make the point of the tooth the *thickest* part of the circumference of the saw, enables the sawyer to dispense in a great measure with the use of the swage. Those inserted tooth saws which do not possess this improvement must be carefully swaged and filed at least twice per day, and sometimes as often as six or seven times per day, depending upon the kind of lumber being cut. In filing or swaging the saw, be careful to form the point of the teeth absolutely square, and even across, the slightest deviation from perfect truth in this respect being apt to cause the saw to *run*, as it is termed, or vary from its proper course while passing through the log. Some prefer to form the point of the tooth a little hooking, just enough so as to be barely perceptible, and in swaging to use *that part* of the die belonging to the swage, which gives the tooth of the saw a slightly

curved or rainbow form, something in this shape ⌒, or scarcely so much curved. One sawyer of 20 years' experience in running machinery, informed us that he never did better or more rapid work with his mill than when he kept his saws exactly right on these *two points* just stated. If you can run a No. 7 gauge saw on your mill, the loss resulting from sawdust will be very slight, and as large saws are generally thickest at the centre, tapering off towards the circumference, this size or No. 6 will, as a general rule, be found sufficiently strong for most purposes. Make sure at all times, especially during frosty weather, that the dogs have a secure hold of the log before the saw enters it. It is only a few days ago that a case came to my knowledge of a firm near Fredericton, N.B., having sustained a severe loss by a log (insufficiently secured of course) canting over on the saw as it was passing through it. The effect was to break off the saw from the mandril, twist off the nut at the end near the saw, and break away the two iron pins used for securing the saw in the collar, causing a stoppage of the mill, and the consequent expense of repair and delay. When you get the mill in operation, see that you handle it carefully, and maintain unceasing watchfulness over it while in operation. Give it *plenty of power;* if you *don't* you may as well shut up shop at once; *good attendance,* and with a good machine, the attendants will not have much time to play themselves, I can assure you. Keep all the parts well *oiled*—that has a great deal to do with the smooth and successful running of the machine. In order to facilitate calculations regarding the velocity of saws, herewith is appended a reliable table to serve as a guide in ascertaining the proper speed for running :—

TABLE OF SPEED FOR CIRCULAR SAWS.

36	inches	in	diameter,	1000	revolutions per minute
38	"	"		950	" "
40	"	"		900	" "
42	"	"		870	" "
44	"	"		840	" "
46	"	"		800	" "
48	"	"		760	" "
50	"	"		725	" "
52	"	"		700	" "
54	"	"		675	" "
56	"	"		650	" "
58	"	"		625	" "
60	"	"		600	" "
62	"	"		575	" "
64	"	"		560	" "
66	"	"		545	" "
68	"	"		530	" "
70	"	"		515	" "
72	"	"		500	" "
74	"	"		485	" "
76	"	"		475	" "
Shingle machine saws				1400	" "

The march of improvement in the manufacture of shingle machines has been truly wonderful, and they can now be procured from the manufacturer, of almost any capacity and power, at very reasonable rates. Shingle machines are now in use, which cut over 30,000 shingles per day, carrying two or more bolts. Some of them possess very complex machinery, and are positively dangerous to operate unless continual vigilance is maintained. One gentleman, well known to the writer, was crippled for life by having his hand terribly lacerated, during an unguarded moment, by one of these machines. As a rule the less gearing and the more simplicity there is about the mechanism of a shingle machine the more satisfaction will be derived from it.

In the manufacture of shingles, as well as in anything else, it is the wisest policy to use the best materials. Get good rift, free from knots, sand, bark, &c., and you will inevitably get good merchantable stuff, with less waste and more pleasure every way, both with the machinery in the first place, and the satisfactory state of your exchequer, in the last. It is all the better if you can lay in a good stock one year ahead, as it cuts much easier when properly seasoned, to say nothing of the saving in weight during transportation. In edging shingles, many prefer the saw to the revolving knives, as it enables the operator, in many cases, to get a shingle of extra quality by trimming a poor shingle down, and selecting the best part. This can be done by a smart hand with marvellous rapidity, but still, to use a modern phrase, many persons can't see it, and so they use the knives, giving what they conceive to be good reasons for so doing.

Velocities of Wood Working Machinery.—*Circular Saws* at periphery, 6000 to 7000 ft. per minute; *Band Saws*, 2500 feet; *Gang Saws*, 28 inch stroke, 120 strokes per minute; *Scroll Saws*, 300 strokes per minute; *Planing Machine Cutters*, at periphery, 4000 to 6000 feet. Work under planing machine 1-20th of an inch for each cut. *Moulding Machine Cutters*, 3500 to 4000 feet; *Squaring-up Machine Cutters*, 7000 to 8000 feet; *Wood Carving Drills*, 5000 revolutions; *Machine Augurs*, 1½ in. diam., 900 revolutions; ditto, ⅜ in. diam., 1200 revolutions; *Gang Saws*, require for 45 superficial feet of pine per hour, 1 horse-power. *Circular Saws* require 75 superficial feet per hour, 1 horse-power. In oak or hard wood ⅔ths of the above quantity require 1 horse-power; *Sharpening Angles of Machine Cutters*. Adzing soft wood across the grain, 30°; *Planing Machines*, ordinary soft wood, 35°; *Gauges and Ploughing Machines*, 48°; *Hardwood Tool Cutters*, 50° to 55°.

Cement for Belting. *Waterproof.*—Dissolve gutta percha in bisulphide of carbon to the consistence of molasses, slice down and thin the ends to be united, warm the parts, and apply the cement, then hammer lightly on a smooth anvil, or submit the parts to heavy pressure.

Filing Saws.—The grand secret of putting any saw in the best possible order, consists in filing the teeth at a given angle to cut rapidly, and of a uniform length so that the points will all touch a straight edged rule without showing a variation of the hundredth part of an inch. Besides this, there should be just set enough in the teeth to cut a kerf as narrow as it can be made, and at the same time allow the blade to work freely without pinching. On the contrary, the kerf must not be so wide as to permit the blade to rattle when in motion. The very points of the teeth do the cutting. If one tooth is a twentieth of an inch longer than two or three on each side of it, the long tooth will be required to do so much more cutting than it should, that the sawing cannot be done well, hence the saw goes jumping along, working hard and cutting slowly; if one tooth is longer than those on either side of it, the short teeth do not cut although their points may be sharp. When putting a cross-cut saw in order, it will pay well to dress the points with an old file, and afterwards sharpen them with a fine whetstone; much mechanical skill is necessary to put a saw in prime order; one careless thrust with a file will shorten the point of a tooth so much that it will be utterly useless, so far as cutting is concerned; the teeth should be set with much care, and the filing done with the greatest accuracy. If the teeth are uneven at the points, a large flat file should be secured to a block of wood in such a manner that the very points only may be so jointed, so that the cutting edge of the same may be in a straight line, or circle, if it is a circular saw; every tooth should cut a little as the saw is worked. The teeth of a hand saw for all kinds of work should be filed fleaming, or at an angle on the front edge, while the back edges may be filed fleaming or square across the blade.

As regards such saws as are used for cutting up large logs into lumber, it is of the utmost importance to have them filed at such an angle as will ensure the largest amount of work with the least expenditure of power. The following diagrams will help to illustrate our meaning. Fig. 1 shows

the shape of teeth which nearly all experienced mill-men consider as that standard form which combines the greatest amount of strength and capacity for rapid work, with the minimum of driving power while doing the work.

Figure No. 2 represents a passable form of teeth which are capable of

FIG. 1.

doing a good deal of work, but their great weakness lies in their slender points. Look out for "breakers" when teeth of this description are passing through dry spruce or hemlock knots.

FIG. 2.

Fig. No. 3 illustrates the appearance of one of those intolerable wood rasps which are altogether too common in saw-mills. Only think what an appalling waste of valuable power is required to drive a "jigger" like this through a large log!

FIG. 3.

Fig. 4, at *a*, is intended to show the method of ascertaining the proper angle, that of sixty degrees, at which such saws *should* be filed. The diagram being self-explanatory requires but little further elucidation here. A quarter circle with lines radiating from the centre towards the circumference is represented near the verge of the segment of a circular saw. The

lower part corresponds with the level of the horizon, and the higher part at 90° corresponds with the zenith or meridian, where the sun appears at noon-day. Exactly half-way up is 45° ; look up a little higher and you will find 60°, indicated by the radiating line which runs parallel with the angle of the tooth of the saw, and this is the guide you must follow in filing. The same rule is seen applied to a straight mill saw at *b*.

Many good authorities contend that mill saws should in no case be set with the instrument commonly used for that purpose, but that in lieu thereof the teeth should be spread out at the points with the swage or upset to a sufficient extent to permit the body of the saw to operate without binding. Both instruments require to be skilfully handled, and the swage, when used in this way, has proved itself equal to every emergency without the risk of breaking the teeth. It would be quite safe to say that the saw-set should only be used on saws of this description with the most extreme caution and care. Every manufacturer, however, has his own opinion, and

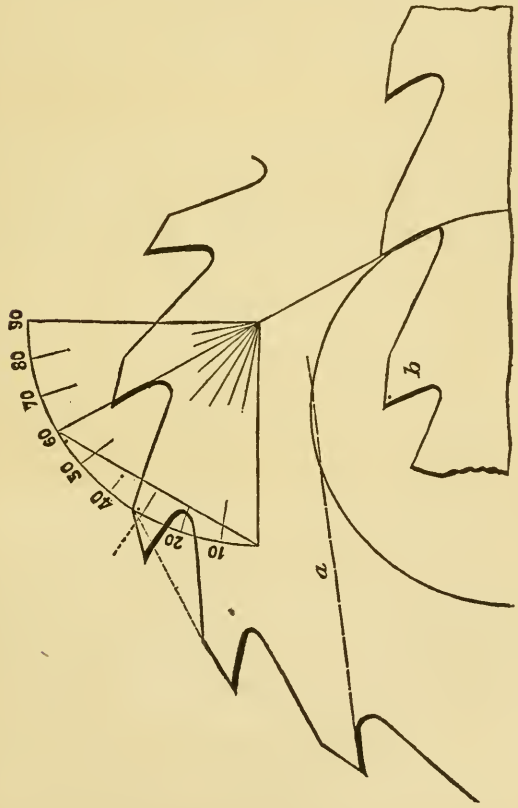


Fig. 4.

consequent practice on the subject, some contending that one way is right, and the other directly the reverse.

To Repair Fractured Circular Saws.—The best way to do this is

to drill a small round hole at the termination of the crack, which effectually prevents its further extension. I save seen some circular saws very neatly repaired by riveting thin clamps to each side of the fracture, both clamps and rivets being countersunk so they will be level with the surface of the saw, and placed in such a position across the crack as to impart the greatest possible strength to the weakest place.

To Mend Broken Cross-cut Saws.—In the first place scarf off the broken edges in such a manner that when lapped over each other they will be about the same thickness as the rest of the plate, and rivet them together loosely with iron rivets inserted through holes which must be punched for that purpose ; the ends must be united with great accuracy so that the teeth, &c., of the saw may range truly. Now place the saw in the fire, then a flux of powdered borax and sal ammonia is flowed all over it after having it raised to the proper heat. See page 270 for preparing and using the composition. Return the saw to the fire and when it is raised to the proper welding heat, place it on the anvil and unite the joint as rapidly as possible with the hammer ; be careful not to heat so hot as to injure the steel. When the job is well done, and the part properly tempered, it will be found as strong as the rest of the plate. I know one blacksmith in Canada who told me that this class of work was the best paying part of his business.

Quantity and Cost of Supplies for Horses and Lumbering Crews in the Woods.—The following figures have been kindly furnished for this work by the obliging manager of Messrs. Gilmour's mill on the Gatineau, near Ottawa, Canada, and are most valuable as affording a basis for calculating the quantity and quality of the supplies required for men and horses engaged in this branch of industry. These calculations are the result of long experience in the business, and are based on actual consumption.

Quantity of Oats for each span of horses,			51	lbs. per day.
"	Hay	" "	40	"
"	Flour used by each man		2.80	"
"	Pork	" "	1.22	"
"	Beef	" "	0.85	"
"	Beans	" "	0.33	"
"	Fish	" "	0.12	"
"	Onions	" "	0.13	"
"	Potatoes	" "	0.47	"
Total daily consumption per man			4.92	
Quantity of Tea used		"	1½	lbs. per month.

The daily allowance of oats for each span of horses may appear large, but it must be remembered that the labor is extremely severe, and more hay will be required if any part of the oats is withheld. On making inquiry with reference to the item of molasses, so largely used by our lumbering friends in New Brunswick and Maine, the answer returned was that owing to the heavy cost of the commodity, it was entirely omitted from the list of supplies. The following exhibits the comparative value of Mess and Prime Pork, calculated from actual consumption :—

Mess Pork.	*Prime Mess.*	*Mess Pork.*	*Prime Mess*
$26	$18 80	$19	$13 70
25	18 08	18	12 97
24	17 35	17	12 24
23	16 62	16	11 51
22	15 89	15	10 78
21	15 16	14	10 05
20	14 43	13	9 32

12	8 59	10	7 13
11	7 86	9	6 46

1 Barrel Mess averages 37 lbs. grease, 6 lbs. bones, when cooked.
1 " Prime Mess 24 " 13 " "

To Mend Broken Saws.—Pure silver, 19 parts; pure copper, 1 part; pure brass, 2 parts; all to be filed into powder, and thoroughly mixed; place the saw level on the anvil, broken edges in contact, and hold them so; now put a small line of the mixture along the seam, covering it with a larger bulk of powdered charcoal; now with a spirit lamp and a jeweller's blow-pipe hold the coal dust in place, and blow sufficient to melt the solder mixture; then with a hammer set the joint smooth, and file away any superfluous solder, and you will be surprised at its strength; the heat will not injure the temper of the saw.

Fitting a New Back on an Old Millstone.—Block your stone up with a block of wood, having its face down until it lies even, solid, and perfectly level; then pick and scrape off the old plaster down to the face blocks, so that none remains but what is in the joints of the face blocks; then wash these blocks and keep them soaked with water. Keep a number of pieces of burr blocks at the same time soaked with water. Take a pail half filled with clean water, and mixed with 2 tablespoonfuls of glue water, boiled and dissolved; mix in with your hand plaster of Paris until it be thick enough that it will not run; and, breaking all the lumps, pour this on the stone, rubbing with your hand; the stone being at the same time damped; and place small pieces of stone all over the joints of the face blocks; you then, with more plaster, mixed in the same way but more stiff, with this and pieces of burr stones, build walls around the eye and verge 4 or 5 inches high, leaving the surface uneven and the eye larger, as it will be brought to its proper size by the last operation. It is better to build up the wall of the running stone round the verge for 3 inches without any spalls, so that the holes may be cut in to balance it. If you wish to make your stone heavier, you will take small pieces of iron, perfectly clean and free from grease, and lay them evenly all around the stone in the hollow place between the two walls just built; and, with plaster mixed a little thicker than milk, pour in under and all the crevices in the iron until the surface is nearly level with the two walls. If the stones do not require additional weight added, instead of iron use pieces of stone the same way, leaving the surface rough and uneven. Again, as before, build walls around the verge of the stone, and round the eye of the stone, until they are within 2 inches of the thickness you want your stones to be, the wall around the eye being 2 inches higher than that round the verge, and filling the space between the walls with stones; and pouring in plaster again, make it nearly level with the walls, but leaving the surface rough and jagged, to make the next plaster adhere well to it. Let it stand until the back is dry and perfectly set, when you raise the stone upon its edge, and, with a trowel, plaster around the edge of the stone neatly, giving it a taper of half an inch from the face to the back of the stone. When cased round in this way, lay the stone down on the cock-head; it being in the balance ryne, put the driver off, then raise the spindle and balance the stone as already directed before putting on the remainder of the back. Then have a tin made the size of the eye, and to reach from the balance ryne to the thickness you want the stone to be at the eye. This tin should be exactly fitted to its place, and made fast; then fit a hoop of wood or iron round the verge, having the upper edge of the thickness from the face you want the stone to be at the verge, and equal all round. This hoop should be greased; and all the cracks round it and the tin in the eye, being stopped, you pour thin plaster (with more glue water than in previous operations, to prevent it from setting so quickly, and to gives time to finish off the back correctly) until it be level with the hoop round the verge, and with a straight edge, one end resting on the hoop, and the other end resting on the tin at the eye; then by moving it round and working the plaster with a trowel, make the surface of the back even and

smooth between these two points. The hoop is then taken off, and the back and edges planed smooth; then lower the spindle until your runner lies solid, and put your band or hoop on, it being first made nearly red hot, and taking care that it is of sufficient size not to require too much driving; if fitting too tightly, it may loosen the back in driving it to its proper place; it may be cooled gently by pouring water on it; and when cool it should fit tight.

Balancing a Millstone.—First, take off the driver, that the stone may have full play on the cock-head; then raise the spindle so that there may be room between the stone to see the balance. Find the heaviest parts, and near the verge lay on sufficient weight to balance it. Cut a hole in the back of the stone, as deep as you can make it and as near the verge as possible that the binding iron hoop of the stone may keep the lead in its place. This hole should be wider at the bottom than the top in order to retain the lead when the stone is in motion, and into this the melted lead should be poured until it brings the stone completely into balance. When the lead is cold, cover over with mixed plaster even with the back of the stone.

Composition to Keep Millstones Clean.—Hot water, 1 gal.; borax 2 oz.; washing soda, ¼ lb. and three balls of the size of a hazel nut each, of sal prunel. Mix and apply it to burrs with a scrubbing brush. When grinding garlic wheat it is not necessary to take up the burrs at all. It is sufficient to drop through the eye of the burr twice per day one of the above described balls of sal prunel, and that will keep the burrs sharp and clean, enabling the miller at all seasons to use the No. 13 bolt, to make finer flour and in greater quantity than usual.

Holes in Millstones are filled with melted alum, mixing burr sand with it. If the hole is large, put some pieces of burr mill stones in it first, and pour in melted alum. These pieces of block should be cut exactly to fit. There should be small joints, and fastened with plaster of Paris. These holes should be cut at least 4 inches deep; there is then no danger of their getting loose.

Rock Dams are incomparably the best in use, if there is plenty of material at hand for building, and a rock bottom to the stream; if there is not a rock bottom you should dig a trench in the bottom, deep enough, so that the water cannot undermine it. This should be the same as if you were building the foundation of a large building. The wall to be built should be of a small circular form, so that the back of the circle should be next to the body of water, which may by its pressure tighten it. To secure the water from leaking through at the ends of the dam, dig a ditch deeper than the bottom of the river; then fill this with small pieces of rock, and pour in cement. This cement is made of hydraulic cement, and is made of one part of cement to five parts of pure sand. It will effectually stop all crevices. A rock dam if well built will be perfectly tight. Use as you conveniently can move; building this wall 4 to 6 feet thick, according to the length of the dam, with jam or buttresses every place where they are needed to strengthen it; make true joints to these rocks, especially on the ends so that they may join close together. When you have the outside walls laid in cement for every layer fill the middle up with pieces of small rock, pouring in your grout, so that there may not be a crevice but what is filled. If there is any crevice or hole left open, the water will break through, wearing it larger and larger. If the stream is wide and large, it is necessary to build the dam in two sections, which should be divided by a waste way, necessary for the waste, or surplus water, to run over, to keep the head in its proper place or height. Let each section, next to where the water is to be run over, be abutments, built to strengthen the dam. The last layer of rock, on the top where the waste water runs over, should project 5 or 6 inches over the back of the dam so that the water may not undermine it. This last layer should be of large rocks and jointed true; then laid in hydraulic cement, in proportion of 1 of cement to 3 of sand.

When the dam is built, the front should be filled up with coarse gravel or clay; this is best done with teams, for the more it is tramped the more durable it becomes.

Frame-Dams.—In building a frame dam, commence with a good foundation, laying the first sills in the bottom, of sufficient depth. They should be large square timbers that will last in the water without rotting. Where there is a soft foundation, the bottom should first be made level; then dig trenches for the mudsills, about 7 or 8 feet apart, lengthways of the stream, and 10 or 12 feet long. Into these first sills other sills must be framed, and put crosswise of the stream, 6 or 8 feet apart, to reach as far across the stream as necessary. Then two outside sills should be piled down with 2-inch plank driven down to a depth of 4 or 5 feet. If this can be done conveniently, they are to be jointed as closely as possible. It would be better to line with some stuff 1 inch thick; then with posts their proper length, about 12 or 14 inches square, which should be framed into the uppermost sill, in both sides, and all the way across the dam, from bank to bank, at a distance of 6 feet apart. Then, with braces to each post, to extend two-thirds of the length of the post, where they should be joined together with a lock, instead of a mortise and tenon, with an iron bolt 1 or 1¼ inches in diameter, going through both, and tightened with a screw and nut. When mortises and tenons are used, they often become rotten and useless in a few years. These braces should be set at an angle of 50 or 60° with the other end mortised into the mud sill. These braces require to be about 6 to 8 inches, and as long as you find necessary; being covered with dirt it will not decay for a long time, as the air is excluded. These posts should be capped from one to the other, plate fashion. The posts should be lined with 2 or 2½ inch plank on the inside, pinned to the plank, and should, in the middle, be filled in with dirt.

If the stream is large and wide, the dam should be built in two sections, which should be divided by a waste-way for the surplus water, which should be in the centre of the dam, and sufficient for all the waste-water to run over. Let each section of the dam form an abutment next to the waste-way, placing cells or sills 4 feet apart the length of the waste-way; in each of these sills, posts should be framed with a brace for the sides. These rows of posts, standing across the dam, will form the sectional abutments; the middle one may be constructed by being lengthways of the stream, with short braces, so that they will not be in the way of drift-wood passing down the stream; it being necessary for strong pieces for a bridge. Then cover the sills with an apron of 2-inch plank joined perfectly straight, to extend 30 or 40 feet below the dam, to prevent undermining of the dam. The planks which are used for the purpose of lining the posts which form the abutments of each section of the dam, and the ends of the waste-way, should be truly pointed, so as to prevent any leakage. The dam being built, the dirt should be filled in with teams, as the more it is tramped the better. Clay or coarse gravel is the best. Then place your gates on the upper side of the waste-way, the size that is necessary to a level with low-water mark; which gates are not to be raised except in times of high water, as the proper height of the mill-pond should be regulated by boards placed over the gate for the desired head, as the water should be allowed to pass at all times freely over them. To strengthen the dam, if you think necessary, 2-inch plank may be used in lining the front side of the dam, long enough to reach from the bottom of the stream on an inclined plane, and next to the body of water to the top of the dam, and filled up nearly to the top of the dam with clay or gravel well trampled down.

Brush or Log Dams are very often used in small, muddy streams. When the bottom of the stream is of a soft nature, take a flat boat where you want to fix your dam, and drive piles the whole length of the stream, about 3 or 4 feet apart, as deep as you can. Take young oak saplings pointed at the end, for the purpose. If you can, construct a regular pile-driver, similar to those in use for making trestle-work on the railways.

The weight may be pulled up by horses instead of an engine. When you have finished driving piles, make some boxes or troughs of 2 or 3 inch plank, about 3 feet wide and as long as the plank is. Sink these in the water the length of the dam, close to the piles, by loading them with rock, until they are at the bottom of the stream, filling in the front part of the dam with dirt and brush, nearly to the height you want it. This kind of a dam will last a long time.

Whenever there is a small break in the dam or race, cut up some willows and brush, put them in the break along with some straw and dirt, and ram them down with clay.

In regard to the flume, the greatest care must be taken to insure strength and durability combined with tightness. Every step taken in its construction must be of such a nature as to unite these qualities in the highest possible degree, otherwise the whole is, in a manner, labor lost.

Mill Dams.—When building a dam, you should select the most suitable place. If you can, place it across the stream near a rocky bluff so that the end of the dam may run into the bluff. This will prevent the water running by at the ends of the dam. Build your dam very strong; if this is not done, they are breaking up often, causing ruinous expense in money and loss of time.

Flour Mill Machinery.—For each pair of 4 feet stones, with all the necessary dressing machinery, etc., there is required 15 horses' power. *Stones*, 4 ft. diam., 120 to 140 revolutions per minute. *Dressing Machines*, 21 ins. diam., 450 to 500 revolutions per minute. *Elevator*, 18 ins. diam., 40 revolutions per minute. *Creepers*, 3½ ins. pitch, 75 revolutions per minute. *Screen*, 16 ins. diam., 300 to 350 revolutions per minute. 788 cubic feet of water, discharged at a velocity of 1 foot per second, are necessary to grind and dress a bushel of wheat per hour = 1.40 horses' power per bushel. 200 feet per minute for the velocity of a stone 4 feet in diam. may be considered a maximum speed.

Velocity of Wheels, Pulleys, Drums, &c.—When wheels are applied to communicate motion from one part of a machine to another, their teeth act alternately on each other; consequently, if one wheel contains 60 teeth and another 20 teeth, the one containing 20 teeth will make 3 revolutions while the other makes but 1; and if drums or pulleys are taken in place of wheels, the effect will be the same; because their circumferences, describing equal spaces, render their revolutions unequal; from this the rule is derived, namely :—

Multiply the velocity of the driver by the number of teeth it contains, and divide by the velocity of the driven. The quotient will be the number of teeth it ought to contain; or, multiply the velocity of the driver by its diameter, and divide by the velocity of the driven.

Example 1. If a wheel that contains 75 teeth makes 16 revolutions per minute, required the number of teeth in another, to work into and make 24 revolutions in the same time. According to rule, you multiply 16 by 75, and divide the product, which is 1200, by 24, and you have the answer, 50 teeth.

Example 2. Suppose a drum, 30 inches in diameter, to make 20 revolutions per minute, required the diameter of another to make 60 revolutions per minute. According to rule, you multiply 20 by 30, and divide the product, which is 600, by 60, and you have the answer, 10 inches.

Example 3. A wheel 64 inches in diameter, and making 42 revolutions per minute, is to give motion to a shaft at the rate of 77 revolutions in the same time; find the diameter of a wheel suitable for that purpose. According to rule, multiply 42 by 64, and divide the product, which is 2688, by 77, and you will have for the answer 35 inches nearly.

231

378

308 70

Example 4. Suppose a pulley 32 inches diameter to make 26 revolutions; find the diameter of another to make 12 revolutions in the same time.

According to rule, $26 \times 32 \div 12 = 69\frac{1}{3}$—

26 and 12) 832. This will be seen to be $69\frac{1}{3}$

32

—— $69\ 4\text{-}12 = \frac{1}{3}$

832

Example 5. Find the number of revolutions per minute made by a wheel or pulley 20 inches in diameter, when driven by another 48 inches in diameter, and making 45 revolutions in the same time. According to rule, $48 \times 45 \div 20 = 108$. That is, 48 multiplied by 45 = 2160, divided by 20, gives the answer, 108 revolutions.

Cotton Factory.—*Condensing Engine, Cylinder*, 37 in. diam. *Stroke of piston*, 7 ft. *Volume of piston space*, 53.6 cubic ft. *Average pressure of steam* 16.73 lbs. per square inch. *Revolutions*, 17 per minute. *Friction of Engine and Shafting* (indicated), 4.75 lbs. per sq. inch of piston. *Indicated Horses Power*, 125. Total power = 1. Available, deducting friction, = 717.

(The foregoing has reference to an English Mill, fordriving 22,060 hand mule spindles, with preparation, and 260 Looms, with common sizing.)

Remarks.—Each indicated horse's power will drive 305 hand-mule spindles, *with preparation.*

or 230 self acting "

or 104 throstle "

or 10.5 looms with common sizing.

Including preparation :

1 throstle spindle = 3 hand-mule, or 2.25 self acting spindles.

1 self acting spindle = 1.2 hand-mule spindles.

Exclusive of preparation, taking only the spindle :

1 throstle spindle = 3.5 hand-mule, or 2.56 self acting spindles.

1 self acting spindle = 1.375 hand-mule spindles.

The throstles are the common, spinning 34 twist for power loom weaving; the spindles revolve 4000 times per minute. The *self-acting* mules are, one-half spinning 36's weft, spindles revolving 4800; the other half spinning 36's twist, spindles revolving 5200. The hand-mules spinning about equal quantities of 36's weft and twist. Weft spindles 4700, and twist spindles 5000 rev. per minute. Average breadth of looms 37 ins. (weaving 37 ins. cloth), making 123 picks per minute. All common calicoes about 60 reed, Stockport count, and 68 picks to the inch. No power consumed by the sizing. When the yarn is dressed instead of sized, one horse's power cannot drive so many looms, as the dressing machine will absorb from .17 to .14 of the power.

Size for Dressing Cotton Yarn or Warps.—Flour, 280 lbs.; tallow, 1 lb.; add ½ to 2 per cent. of the amount of flour employed of paraffine. The paraffine may be made to replace the whole, or a part of the tallow employed.

Beautiful Sizing for Linen.—Crystallized carbonate of soda, 1 part; white wax, 4 to 6 parts; stearine, 4 to 6 parts; pure white soap, 4 to 6 parts; fine Paris white or carbonate of magnesia, 20 parts; potato starch, 40 parts; fine wheat starch, 160 parts; boil with sufficient water to form 1600 parts altogether, adding, if desired, some ultramarine to counteract the yellow tint of the linen. The linen is starched with this preparation, afterwards steamed and dried, then sprinkled with soap-water and placed in the stamping mill, afterwards steamed and calendered.

To Improve Poor Iron.—Black oxide of manganese, 1 part; copperas and common salt, 4 parts each; dissolve in soft water, and boil till dry; when cool, pulverize, and mix quite freely with nice welding sand. When you have poor iron which you cannot afford to throw away, heat it, and roll it in this mixture; working for a time, reheating, etc., will soon free it from all impurities, which is the cause of its rottenness. By this process you can make good horse nails out of common iron.

Case-Hardening for Iron.—Cast iron may be case-hardened by heating to a red heat, and then rolling it in a composition composed of equal parts of prussiate of potash, sal-ammoniac, and saltpetre, all pulverized and thoroughly mixed. This must be got to every part of the surface; then plunged, while yet hot, into a bath containing 2 ozs. prussiate of potash, and 4 ozs. sal-ammoniac to each gallon of cold water.

Moxon's Case-Hardening Process.—Cow's horns or hoofs are to be baked, dried and pulverized in order that more may be got into the box with the articles, or bone dust answers very well. To this add an equal quantity of bay salt; mix them with stale chamber lye, or white wine vinegar; cover the iron with this mixture, and bed it in the same in loam, or enclose it in an iron box, lay it on the hearth of the forge to dry and harden; then put it into the fire, and blow till the lump has a blood red heat, and no higher, lest the iron mixture be burnt too much. Take the iron out and throw it into cold water.

For Malleable Iron.—Put the articles in an iron box, and stratify them among animal carbon, that is, pieces of horns, hoofs, skins, or leather, just sufficiently burned to be reduced to powder. Lute the box with equal parts of sand and clay; then place it in the fire, and keep at a light red heat for a length of time proportioned to the depth of steel required, when the contents of the box are emptied into water.

Another for Wrought Iron.—Take prussiate of potash, finely pulverized, and roll the article in it, if its shape admits of it; if not, sprinkle the powder upon it freely, while the iron is hot.

To Make Iron take a Bright Polish like Steel.—Pulverize and dissolve the following articles in 1 qt. hot water; blue vitriol, 1 oz.; borax, 1 oz.; prussiate of potash, 1 oz.; charcoal, 1 oz.; salt, ½ pt.; then add 1 gal. linseed oil, mix well, bring your iron or steel to the proper heat and cool in the solution. It is said the manufacturers of the Judson governor paid $100 for this receipt, the object being to case harden iron so that it would take a bright polish like steel.

To Weld Cast Iron.—The best way of welding cast iron is to take it at a very intense heat, closely approaching the melting point. In this state it will be found sufficiently malleable to stand welding by the hammer. There are other methods, but most of them are attended by almost insurmountable difficulties.

To Soften Malleable Iron.—When your furnace is charged with fuel and metal, get the fire up to a dull red heat, then pour fluoric acid all over the coke; use ½ pt. or even 1 qt. adding a handful of fluor spar; it will make the metal much softer.

Iron Manufacture.—Charcoal, 138 bushels, limestone, 432 lbs., and ore 2612 lbs., will produce 1 ton of pig iron. In England temperature of hot blast is 600°, density of blast and of refining furnace 2½ to 3 lbs. per square inch. Revolutions of puddling rolls, 60 per minute; rail rolls, 100; rail saw, 800.

To Galvanize Grey Iron Castings.—Cleanse the articles in an ordinary chaffing mill, which consists of a barrel revolving on its axis, containing sand; when the sand is all removed, take them out and heat one by one, plunging, while hot, in a liquid composed as follows: 10 lbs. hydrochloric acid and sufficient sheet zinc to make a saturated solution. In making this solution, when the evolution of gas has ceased, add muriate, or preferably sulphate of ammonia, 1 lb., and let it stand till dissolved. The castings should be so hot that when dipped in this solution, and instantly removed, they will immediately dry, leaving the surface crystallized like frost work on a window pane. Next plunge them while hot, but perfectly dry, in a bath of melted zinc, previously skimming the oxide on the surface away, and throwing thereon a small amount of powdered sal ammoniac. If the articles are very small, inclose them in a wrought iron basket on a pole, and lower them into the metal. When this is done, shake off the superfluous metal, and cast them into a vessel of water to prevent them adhering when the zinc solidifies.

To Soften Cast Iron for Turning.—Steep it in 1 part of aquafortis to 4 of water, and let it remain in 24 hours.

Cast Iron Ornaments are rendered susceptible of being finished with a scraper, where they cannot be reached with files, after having the following liquid applied to them.

Scaling Cast Iron.—Vitriol, 1 part; water, 2 parts; mix and lay on the diluted vitriol with a cloth in the form of a brush, enough to wet the surface well; after 8 or 10 hours. wash off with water, when the hard, scaly surface will be completely removed.

To Chill Cast Iron very Hard.—Use a liquid made as follows: soft water, 10 gallons; salt, 1 peck; oil vitriol, ½ pt.; saltpetre, ½ lb.; prussiate of potash, ¼ lb.; cyanide of potash, ½ lb. Heat the iron a cherry red and dip as usual, and if wanted harder repeat the process.

Another to Harden Cast Iron.—Salt, 2 lbs.; saltpetre, ½ lb.; roche alum, ½ lb.; ammonia, 4 ozs.; salts of tartar, 4 ozs.; pulverize all together and incorporate thoroughly, use by powdering all over the iron while it is hot, then plunging it in cold water.

Russia Sheet Iron.—Russia sheet iron is, in the first instance, a very pure article, rendered exceedingly tough and flexible by refining and annealing. Its bright, glossy surface is partially a silicate, and partially an oxide of iron, and is produced by passing the hot sheet, moistened with a solution of wood-ashes, through polished steel rollers.

Japanning Castings.—Clean them well from the sand, then dip them in or paint them over with good boiled linseed oil; when moderately dry, heat them in an oven to such a temperature as will turn the oil black, without burning. The stove should not be too hot at first, and the heat should be gradually raised to avoid blistering; the slower the change in the oil is effected the better will be the result. The castings, if smooth at first, will receive a fine black and polished surface by this method.

Burning Iron Castings Together.—The usual mode is by imbedding the castings in the sand, having a little space left vacant round about the joint where it is to be burned. Two gates must then be provided, one lying on a level with the lower side of this space, and the other raised so that the metal, which must be very hot, is poured in at the higher one; it passes round, fills up the space, and runs off at the lower gate. A constant supply of metal is thus kept up, till the parts of the casting are supposed to be on the eve of melting. The lower gate is then closed, and the supply stopped. When cool, and the superfluous metal chipped off, it forms as strong a joint as if it had been original.

To Mend Cracked Cast-Iron Vessels.—Drill a hole at each extreme end of the crack, to prevent its further extension, plug rivet the holes with copper, and, with fine iron filings saturated with urine, caulk the crack. Four parts of pulverized clay and one part of iron filings made into a paste with boiling linseed oil and applied hot is a good cement for the same purpose.

Welding Cast Steel.—Silver sand, 2 lbs.; plaster of Paris, 1 lb.; mix thoroughly. Heat your article and dust it with the above, place it in the fire again until you get a red heat and it will weld.

Respirator.—An excellent respirator may be made of a thick sheet of carded cotton wool placed between two pieces of muslin. Unequalled for arresting dust, steel particles, &c.

Annealing Steel.—For small pieces of steel, take a piece of gas pipe 2 or 3 inches in diameter, and put the pieces in it, first heating one end of the pipe, and drawing it together, leaving the other end open to look into. When the pieces are of a cherry red, cover the fire with saw dust, use a charcoal fire, and leave the steel in over night.

To Drill Hardened Steel.—Cover your steel with melted beeswax, when coated and cold, make a hole in the wax with a fine pointed needle or other article the size of hole you require, put a drop of strong nitric acid upon it, after an hour rinse off, and apply again, it will gradually eat through.

Welding Cast Steel.—Rock saltpetre, ¼ lb.; dissolve in ¼ lb. oil vitriol; and add it to 1 gal. water. After scarfing the steel, get it hot; and quench in the preparation. Then weld the same as a piece of iron, hammer it very quick with light blows. It answers the purpose much better than borax; cork it in a bottle, and it will keep for years. *Another.*—Borax, 15 parts; sal-ammoniac, 2 parts; cyanide of potassium, 2 parts; dissolve all in water, and evaporate the water at a low temperature.

German Welding Powder.—Iron turnings, 4 parts; borax, 3 parts, borate of iron, 2 parts; water, 1 part.

Damascus Steel.—It is said that this steel consists of a highly carburetted metal which, by undergoing careful cooling and annealing, separates into two compounds of iron and carbon, giving it the peculiar appearance known as "Damascening." The wonderful strength of this steel is no doubt owing to careful manipulation.

Working Steel for Tools.—In working steel for tools, great care should be taken to hammer all sides alike, for if one side is hammered more than another, it will cause it to spring in hardening. Again, steel, when being hammered, should be heated as hot as it will stand, until finishing, and should then be hammered until almost black hot, for the reason that it sets the grain finer, and gives the tool a better edge. The reason for heating the steel so hot while hammering is simply because it makes the steel tougher when hardened, and softer when annealed, while if it were worked at a low red heat, the continued percussive shocks of the hammer would so harden it as to make it almost impossible to anneal it, and at the same time render it brittle when hardened.

To Soften Iron or Steel.—Either of the following methods will make iron or steel very soft:—1. Anoint it all over with tallow, temper it in a gentle charcoal fire, and let it cool of itself. 2. Take a little clay, cover your iron with it, temper in a charcoal fire. 3. When the iron or steel is red hot, strew hellebore on it. 4. Quench the iron or steel in the juice or water of common beans.

Composition for Welding Cast Steel.—Pulverized borax any quantity, and slightly cover it with dragon's blood. Heat the steel red hot, shake the borax over it; place it again in the fire till the borax smokes on the steel, which will be much below the ordinary welding heat, and then hammer it.

Water Annealing.—Heat the steel to a red heat, and let it lie a few minutes, until nearly black hot; then throw it into soap-suds; steel in this way may be annealed softer than by putting it into the ashes of the forge.

Belgian Welding Powder.—Iron filings, 1000 parts; borax, 500 parts; balsam of copaiba, or other resinous oil, 50 parts; sal-ammoniac, 75 parts. Mix all well together, heat, and pulverize completely. The surfaces to be welded are powdered with the composition, and then brought to a cherry red heat, at which the powder melts, when the portions to be united are taken from the fire and joined. If the pieces to be welded are too large to be both introduced into the forge, one can be first heated with the welding powder to a cherry red heat, and the other afterwards to a white heat, after which the welding may be effected.

Composition Used in Welding Cast Steel.—Borax, 10 parts; sal-ammoniac, 1 part; grind or pound them roughly together; then fuse them in a metal pot over a clear fire, taking care to continue the heat until all spume has disappeared from the surface. When the liquid appears clear, the composition is ready to be poured out to cool and concrete; afterwards being ground to a fine powder, it is ready for use. To use this composition, the steel to be welded is raised to a heat which may be expressed by "bright yellow;" it is then dipped among the welding powder, and again placed in the fire until it attains the same degree of heat as before; it is then ready to be placed under the hammer.

To Restore Burnt Steel and Improve Poor Steel.—Borax, 3 ozs.; sal-ammoniac, 8 ozs.; prussiate of potash, 3 ozs.; blue clay, 2 ozs.; resin,

¼ lb.; water, 1 gill; alcohol, 1 gill. Put all on the fire, and simmer till it dries to a powder. The steel is to be heated, dipped in this powder, and afterwards hammered.

To Restore Burnt Cast Steel.—Borax, 1½ lbs.; sal-ammoniac, ½ lb.; prussiate of potash, ¼ lb.; resin, 1 oz. Pound the above fine, add a gill each of water and alcohol, and boil all to a stiff paste in an iron kettle. Do not boil too long, or it will become hard when cool. The burnt steel is dipped while quite hot in the composition and slightly hammered.

Restoring Burnt Steel.—It is not generally known that burnt steel may be almost instantaneously restored by plunging it while hot in cold water, and hammering it with light strokes on the anvil, turning it so as to hammer all over it, again dipping in the cold water, and repeating the hammering process as before. Try it; if you don't succeed the first time, you will soon do so.

Composition to Restore Burnt Steel.—Two parts horn filings; 10 parts tallow; 1 part sal-ammoniac; 1 part pulverized charcoal; 1 part soda; pulverize the hard ingredients separately, mix all thoroughly with the tallow. Bring your burnt steel to a cherry red and dip it in the mixture; when it gets cold it may be hardened in the usual manner.

Composition to Toughen Steel.—Resin, 2 lbs.; tallow, 2 lbs.; black pitch, 1 lb.; melt together, and dip in the steel when hot.

Gearing a Lathe for Screw Cutting.—Every screw-cutting lathe contains a long screw called the lead screw, which feeds the carriage of the lathe, while cutting screws; upon the end of this screw is placed a gear to which is transmitted motion from another gear placed on the end of the spindle; these gears each contain a different number of teeth, for the purpose of cutting different threads, and the threads are cut a certain number to the inch, varying from 1 to 50. Therefore, to find the proper gears to cut a certain number of threads to the inch, you will first multiply the number of threads you desire to cut to the inch, by any small number, 4 for instance, and this will give you the proper gear to put on the lead screw. Then with the same number, 4, multiply the number of threads to the inch in the lead screw, and this will give you the proper gear to put on the spindle. For example, if you want to cut 12 to the inch, multiply 12 by 4, and it will give you 48. Put this gear on the lead screw, then with the same number, 4, multiply the number of threads to the inch in the lead screw. If it is five, for instance, it will give you 20; put this on the spindle, and your lathe is geared. If the lead screw is 4, 5, 6, 7, or 8, the same rule holds good. Always multiply the number of threads to be cut first. Some, indeed most small lathes, are now made with a stud geared in the spindle, which stud only runs half as fast as the spindle, and in finding the gears for these lathes, you will first multiply the number of threads to be cut, as before, and then multiply the number of threads on the lead screw, as double the number it is. For instance, if you want to cut 10 to the inch, multiply by 4, and you get 40; put this on the lead screw, then if your lead screw is 5 to the inch, you call it 10; and multiply by 4 and it will give you 40. Again put this on your stud and your lathe is geared ready to commence cutting.

Cutting a Screw in an Engine Lathe.—In cutting V thread-screws, it is only necessary for you to practise operating the shipper and slide-screw handle of your lathe, before cutting. After having done this, until you get the motions, you may set the point of the tool as high as the centre, and if you keep the tool sharp, you will find no difficulty in cutting screws. You must, however, cut very light chips, mere scrapings in finishing, and must take it out of the lathe often, and look at it from both sides, very carefully, to see that the threads do not lean like fish scales. After cutting, polish with an emery stick and some emery.

Cutting Square Thread-Screws.—In cutting square thread-screws, it is always necessary to get the depth required, with a tool somewhat thinner than one-half the pitch of the thread. After doing this, make another tool

exactly one-half the pitch of the thread, and use it to finish with, cutting a slight chip on each side of the groove. After doing this, polish with a pine stick, and some emery. Square threads for strength should be cut one-half the depth of their pitch, while square threads, for wear, may, and should, be cut three-fourths the depth of their pitch.

Mongrel Threads.—Mongrel, or half V, half-square threads are usually made for great wear, and should be cut the depth of their pitch, and for extraordinary wear, they may even be cut 1½ the depth of the pitch. The point and the bottom of the grooves should be in width one-fourth the depth of their pitch. What is meant here by the point of the thread, is the outside surface. And the bottom of the groove is the groove between the threads. In cutting these threads it is necessary to use a tool about the shape of the thread, and in thickness about one-fifth less than the thread is when finished. As it is impossible to cut the whole surface at once, you will cut it in depth about one-sixteenth at a time, then a chip off the sides of the thread, and continue in this way alternately till you have arrived at the depth required. Make a gauge of the size required between the threads, and finish by scraping with water. It is usually best to leave such screws as these a little large until after they are cut, and then turn off a light chip, to size them; this leaves them true and nice.

Planing Metals.—The first operation about planing is to oil your planer and find out if the bed is smooth. If it is not, file off the rough places; then change the dogs to see if they will work well, and find out the movements of the planer. After doing this, bolt your work on the bed, and if it is a long, thin piece, plane off a chip, then turn it over and finish the other side, taking two chips, the last of which should be very light. Great care should be taken, in bolting it to the bed, not to spring it. After finishing this side turn it to the other side, and take off a light cut to finish it.

Table Showing Proportions of the Various Parts of Locomotive Engines, from the Best Authorities.

Diam. of Cylinder.	Diam. of Piston Rod.	Diam. of Main Steam Pipe.	Diam. of Valve Stems.	Diam. of Pump Plugger.	Diam. of Crank Pins.	Length of M'n Crank in Bearing.	Diam. of Reverse Shaft Bearings.	Diam. of Driving Axle Journals.	Length of Journals.	Depth of Main Rods.		
										Back End.	Front End.	Thickness.
in.	in	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
8	1½	4½	7/8	1	2¾	2½	1½	4½	5	2	2½	1½
9	1⅝	4⅝		1⅛	2¾	2¾	1⅝	4¾	5¼	2	2½	1⅝
10	1¾	4½	1	1¼	3	3	1¾	4¾	5½	2⅛	2⅜	1¾
11	2	4½	1⅛	1⅜	3	3	1¾	4½	5½	2⅛	2⅜	1¾
12	2	5	1⅛	1⅝	3	3¼	2	5¼	6¼	2¾	2⅝	1¾
13	2¼	5	1¼	1⅝	3¼	3¼	2	5½	6½	3	3	1¾
14	2¼	5	1⅜	1⅝	3¼	3½	2	6	6¼	3	3	1¾
15	2½	6	1½	1⅝	3½	3½	2	6½	6¾	2⅞	3¼	1¾
16	2⅝	6	1⅝	1¾	3½	3¾	2	7	8	3	3½	1¾
17	2¾	6	1⅜	1¾	3½	4	2	6	7	3	3½	1¾
18	3	6	1⅞	2⅛	4	4½	2	6½	7	3	3¾	2
19	3¼	6	2	2⅛	4½	4½	2	6½	7½	3¼	4	2
20	3¼	6	2	2¼	4⅝	4⅝-5	2	6½	7½	3½	4¼	2⅛

Diameter of Cylinder.	Steam Port.	Exhaust Port.	Bridges.
8	$7\frac{1}{2}\times\frac{5}{8}$	$7\frac{1}{2}\times1\frac{1}{4}$	$\frac{5}{8}$
9	$7\frac{1}{2}\times\frac{3}{4}$	$7\frac{1}{2}\times1\frac{1}{2}$	$\frac{3}{4}$
10	$7\frac{1}{2}\times\frac{5}{4}$	$7\frac{1}{2}\times1\frac{1}{2}$	$\frac{5}{4}$
11	10×1	10×2	$\frac{7}{8}$
12	10×1	10×2	$\frac{7}{8}$
13	$12\times1\frac{1}{4}$	$12\times2\frac{1}{2}$	1
14	$13\times1\frac{1}{4}$	$13\times2\frac{1}{2}$	1
15	$14\times1\frac{1}{4}$	$14\times2\frac{1}{2}$	1
16	$15\times1\frac{1}{4}$	$15\times2\frac{1}{2}$	1
17	$16\times1\frac{1}{4}$	$16\times2\frac{1}{2}$	1
18	$17\times1\frac{1}{4}$	$17\times2\frac{1}{2}$	1
19	$17\times1\frac{1}{4}$	$18\times2\frac{1}{2}$	1
20	$18\times1\frac{1}{4}$	$18\times2\frac{1}{2}$	$1\frac{1}{4}$

Planing Perpendicularly.—In planing perpendicularly, it is necessary to swivel the bottom of the small head around, so it will stand about three-fourths of an inch inside of square, towards the piece you are to plane. This prevents breaking the tool when the bed runs back.

Gear Cutting.—In cutting gears, they are reckoned a certain number of teeth to the inch, measuring across the diameter to a certain line which is marked on the face or sides of the gear with a tool. This line is one-half the depth of the teeth from the outer diameter. That is, if the teeth of the gear are two-tenths of an inch deep, this line would be one-tenth of an inch from the edge and is called the pitch line.

Depth of Teeth.—Every gear cut with a different number of teeth to the inch, should be cut of a depth to the pitch line, to correspond with the number of teeth to the inch. This is called proportion. Therefore, if you cut a gear eight to the inch, the depth to the pitch line should be one-eighth of an inch, and the whole depth of the tooth would be two-eighths. Again, if you cut a gear twelve to the inch, the depth to pitch line should be one-twelfth of an inch, and the whole depth of tooth two-twelfths. And again, if you cut a gear twenty to the inch, the depth to pitch line should be one-twentieth of an inch, while the whole depth should be two twentieths, and so on *ad infinitum*.

Measuring to find the Number of Teeth.—To find the size a certain gear should be for a certain number of teeth is an easy matter, if you study carefully these rules. If you want a gear with thirty-two teeth and eight to the inch, it should be four inches measuring across the diameter to the pitch line, and the two-eighths outside of the pitch line would make it four inches and two-eighths. Again if you want a gear with forty teeth and ten to the inch, it should measure across the diameter to pitch line four inches, and the two tenths outside the pitch line would make the whole diameter four inches and two-tenths. And again, if you want a gear with eighty teeth, and twenty to the inch, it should measure to the pitch line, across the diameter, four inches, and the two twentieths outside the pitch line would make it four inches and two-twentieths, and these examples will form a rule for the measurement of all except bevel gears.

Bevel Gears.—These are turned a certain bevel to correspond with each other, according to the angle upon which the shafts driven by them are set. For instance, if two shafts are set upon an angle of ninety degrees, the surfaces of the faces of these gears will stand at an angle of forty-five degrees. To get the surface of these gears, in turning them, put a straight edge across the face. Then set your level on an angle of forty-five degrees, and try the face of the teeth by placing the level on the straight edge. After turning the face of the teeth, square the outer diameter by the face of the teeth;

and to get the size to which you wish to cut, measure from the centre of the face of the teeth. Thus, if a bevel gear is six inches in diameter, and the face of the teeth is one inch, you will measure from the centre of the face, and find it is five inches. On this line you calculate the number of teeth to the inch, and if you want a gear with twenty teeth, and ten to the inch, it should measure two inches across the face to the centre of the surface of the teeth; and if the face of the teeth were one inch in length, the diameter of the gear would be three inches, and the inside of the teeth would measure only one inch. Again, if you want to cut a gear with forty teeth, and ten to the inch, it would measure four inches to the centre of the teeth on the surface. And if the surface of the teeth were one inch long, the diameter of the gear would be five inches, while it would only measure three inches inside the teeth. These examples will form a rule for all bevel gears.

Vulcanite Emery Wheels.—Use a compound of India rubber, and Wellington mills emery, as little of the former as will suffice to hold the particles of emery together. The materials must be thoroughly incorporated together, then rolled into sheets, cut into wheels of the desired size and pattern, pressed into the iron moulds, and vulcanized or cured by being subjected to a high degree of steam heat for several hours, making it almost as hard as cast iron.

To Braze a Band Saw.—*Whitney's method.*—The tools required are a small portable forge, brazing clamps, &c, and a straight edge, 3 or 4 feet long, also some brass wire and powdered borax. Take the saw and cut it to the proper length, scarf the ends from one-half to three-fourths of an inch, then put the saw in the clamps. I would say that I use a very small and simple clamp in the shape of a double vise. Keep the back of the saw out of the jaws of the vise, or clamps, and apply the straight edge to the back, as it is very necessary to braze it straight; make the fire in as small a compass as possible; place the clamps directly over the centre of the fire, and then put on three pieces of brass wire, bent in the form of the letter U, so that they will pinch the laps together; put as much borax as will lie on the saw, cover the whole with a piece of charcoal: melt the brass so that it will flow over the saw before taking it off the fire, and cool very slow so as not to make the braze brittle. File off what remains on the saw and it is ready for use.

To Remove Rust.—If you immerse the articles in kerosene oil and let them remain for some time, the rust will become so much loosened as to come off very easy

Burglar and Drill-Proof Diamond Chill.—Take 1 gal. urine, and add to it 1 oz. borax and 1 oz. salt.

To Re-sharpen Old Files.—Remove the grease and dirt from your files by washing them in warm potash water, then wash them in warm water, and dry with artificial heat; next, place 1 pt. warm water in a wooden vessel, and put in your files, add 2 ozs. of blue vitriol, finely pulverized, 2 ozs. borax, well mixed, taking care to turn the files over, so that each one may come in contact with the mixture. Now add 7 ozs. sulphuric acid and ¼ oz. cider vinegar to the above mixture. Remove the files after a short time, dry, sponge them with olive oil, wrap them up in porous paper, and put aside for use. Coarse files require to be immersed longer than fine.

Substitute for Borax.—Copperas, 1 oz.; saltpetre, 1 oz.; common salt, 6 ozs.; black oxide of manganese, 1 oz; prussiate of potash, 1 oz.; all pulverized and mixed with 3 lbs. nice welding sand, and use the same as you would sand. High-tempered steel can be welded with this at a lower heat than is required for borax.

Dipping Tools when Hardening.—To harden a pen-knife blade, lancet, razor, chisel, gouge-bit, plane, spoke-shave, iron shaving knife, three or four square files, and round and flat files, dip them endwise or perpendicularly. This keeps them straight, which would not be the case were they dipped in the water obliquely.

Substitute for Borax.—Alum, 2 ozs.; dilute with water and mix with

2 ozs. potash, boil in a pot half an hour over a gentle fire, take it out of the water, add 2 ozs. gem salt in powder, as much of alkaline salt, 3 lbs. honey, and one of cow's milk, mix all together, set it in the sun for 3 days and the borax is ready for use. This will go twice as far in a blacksmith's shop as common borax.

To Harden Metals.—Iron, 60 parts; chrome, 40 parts; form a composition as hard as the diamond. A high degree of hardness may also be imparted to iron or steel by adding ¼ part of silver. Copper may be externally hardened by the fumes of zinc and tin. The speculum of Lord Rosse's telescope is 1 part tin and 1 part copper, this is as hard as steel, and takes a very high polish; if more than this be added it will scarcely cohere.

Draw-filing and Finishing.—To draw-file a piece of work smoothly and quickly, it is best to first draw-file it with a medium fine file, and finish with a superfine file. After doing this, polish the work with dry emery paper and then with emery paper and oil.

Lining Boxes with Babbit Metal.—To line boxes properly, so as to insure their filling every time, it is necessary to heat the box nearly red hot, or at least hot enough to melt the metal. Then smoke the shaft where the metal is to be poured upon it. This insures its coming out of the box easily, after it is cold. After smoking the shaft, put it into the box or boxes, and draw some putty around the ends of them, for the purpose of stopping them, taking care not to press upon it, for if you do it will go into the box and fill a place that ought to be filled with metal; and, in the meantime, your metal ought to be heated, and after you have poured it, let the box stand till it is nearly cold; drive out your shaft, and it is done.

Compositions to Fill Holes in Castings.—Mix 1 part of borax in solution with 4 parts dry clay.—*Another*; Pulverized binoxide of manganese, mixed with a strong solution of silicate of soda (water clay) to form a thick paste.

Moulding Sand for Casting Brass or Iron.—The various kinds of good moulding sand employed in foundries for casting iron or brass, have been found to be almost uniform chemical composition, varying in grain or the aggregate form only. It contains between 93 and 96 parts silex, or grains of sand, and from 4 to 6 parts clay, and a little oxide of iron, in each 100 parts. Moulding sand which contains lime, magnesia, manganese and other oxides of metal, is not applicable, particularly for the casting of iron or brass. Such sand is either too close, will not stand or retain its form, or it will cause the metal to boil through its closeness.

To File a Square Hole.—To file a hole square, it is necessary to reverse the work very often; a square file should first be used, and the holes finished with either a diamond-shaped file, or a half round. This leaves the corners square, as they properly should be.

To Turn Chilled Iron.—At Lister's Works, Darlington, England, some articles required turning in the lathe, and cast steel could not be made hard enough to cut them. One man proposed cast metal tools. He was laughed at, of course, but his plan had to be tried. Well, cast metal tools were tried, with points chilled, and they cut when cast steel tools were of no use. The article was turned up with metal tools.

Drilling Holes in Cast Iron.—By means of carbolic acid a hole ¼ of an inch in diameter has been drilled through ½ inch thickness of cast iron, with a common carpenter's brace; judge, then, what can be done by using the acid and pressure drill.

Hardening Wood for Pulleys.—After a wooden pulley is turned and rubbed smooth, boil it for about eight minutes in olive oil; then allow it to dry, and it will become almost as hard as copper.

To Solder Ferrules for Tool Handles.—Take your ferrule, lap round the jointing a small piece of brass wire; then just wet the ferrule, scatter on the joining ground borax, put it on the end of a wire, and hold it in the fire till the brass fuses; it will fill up the joining, and form a perfect solder. It may afterwards be turned in the lathe.

Making Dies for Screw-Cutting.—In making dies for screw-cutting, they should, whenever practicable, be lapped with a taper tap, as they cut more easily and wear longer than those which are cut straight, and then tapered off to make the screw "take."

Very fine threaded screws, however, cut well with straight dies. Small dies, or dies below one-fourth of an inch in size, should only have three lips in them. Dies from one-fourth to one-half should have four lips in them. Dies from three-fourths to one inch should have six lips in them; and dies from one inch to one and a half should have seven lips in them. The cuts through dies should be only twice the depth of the thread, which is sufficient to make them free themselves from chips; for when cut too deep they are liable to break on the face. Harden and draw to a straw color.

To Dip a Fluted Reamer Properly.—Dip it perpendicularly to a short distance beyond the fluting—that is to say, about half an inch, and withdraw and return it several times. This hardens all the lips, and prevents it cracking off at the water's edge, which is the case when a piece of steel is dipped into a certain depth, and allowed to cool without moving.

Anti-Friction Metal.—Copper, 4 lbs.; regulus of antimony, 8 lbs.; Banca tin, 96 lbs. 2. Grain zinc, 7½ lbs.; purified zinc, 7¼ lbs.; antimony 1 lb. 3. Zinc, 17 parts; copper, 1 part; antimony, 1½ parts. This possesses unsurpassable anti-friction qualities, and does not require the protection of outer casings of harder metal. 4. Block tin, 8 lbs.; antimony, 2 lbs.; copper, 1 lb. If the metal be too hard, it may be softened by adding some lead. 5. The best alloy for journal boxes is composed of copper, 24 lb.; tin, 24 lbs.; and antimony, 8 lbs. Melt the copper first, then add the tin, and lastly the antimony. It should be first run into ingots, then melted and cast in the form required for the boxes. 6. Melt in a crucible 1½ lbs. of copper, and, while the copper is melting, melt in a ladle 25 lbs. of tin and 3 of antimony, nearly red hot, pour the two together, and stir until nearly cool. This makes the finest kind of lining metal. 7. *Very cheap*—Lead, 100 lbs.; antimony, 15 lbs. This costs about 10 cents per lb. 8. *For bearings to sustain great weights.*—Copper, 1 lb.; zinc, ½ oz.; tin, 2½ oz. 9. *Hard Bearings for machinery.*—Copper, 1 lb.; tin, 2 ozs. 10. *Very Hard ditto.*—Copper, 1 lb.; tin, 2½ ozs. 11. *Lining metal for Boxes of Railway Cars.*—Mix tin, 24 lbs.; copper, 4 lbs.; antimony, 8 lbs.; (for a hardening) then add tin 72 lbs. 12. *Lining Metal for Locomotive Axle Trees.*—Copper, 86.03; tin, 13.97. 13. *Another French.*—Copper, 82 parts; tin, 10 parts; zinc, 8 parts. 14. *Another*, (*Stephenson's*).—Copper, 79 parts; tin, 8 parts; zinc, 5 parts; lead, 8 parts. 15. *Another* (*Belgian*).—Copper, 89.02 parts; tin, 2.44 parts; zinc, 7.76 parts; iron, 0.78. 16. *Another* (*English*).—Copper, 73.96 parts; tin, 9.49 parts; zinc, 9.03 parts; lead, 7.09 parts; iron, 0.43 parts. 17. *Another.*—Copper, 90.06 parts; tin, 3.56 parts; zinc, 6.38 of *Nickel Anti-friction Metal.*—A late improvement in the manufacture of anti-friction metal is the introduction of a small percentage of nickel into either of the above, or any other anti-friction composition.

Liquid Black Lead Polish.—Black lead pulverized, 1 lb.; turpentine, 1 gill; water, 1 gill; sugar, 1 oz.

Copperas Dip for Cast Iron.—Dissolve 3 lbs. of sulphate of copper, and add 2 fluid ozs. sulphuric acid.

To Enamel Cast Iron and Hollow Ware.—1. Calcined flints, 6 parts; Cornish stone or *composition*, 2 parts; litharge, 9 parts; borax, 6 parts, argillaceous earth, 1 part; nitre, 1 part; calx of tin, 6 parts; purified potash, 1 part. 2. Calcined flints, 8 parts; red lead, 8 parts; borax, 6 parts; calx of tin, 5 parts; nitre, 1 part. 3. Potter's composition, 12 parts; borax, 8 parts; white lead, 10 parts; nitre, 2 parts; white marble, calcined, 1 part; purified potash, 2. parts; calx of tin, 5 parts. 4. Calcined flints, 4 parts; potter's composition, 1 part; nitre, 2 parts; borax, 8 parts; white marble, calcined, 1 part; argillaceous earth, ½ part; calx of tin, 2 parts. Whichever of the above compositions is taken must be finely powdered, mixed and fused. The vitreous mass is to be ground when cold, sifted, and levigated with water; it is then made into a pap with water or gum water. The pap is smeared

or brushed over the interior of the vessel, dried, and fused with a proper heat in a muffle. Clean the vessels perfectly before applying.

To Enamel Copper Vessels.—Pulverize finely 12 parts of fluor spar, 12 parts unground gypsum, and 1 part borax, and fuse together in a crucible; when cold mix with water to a paste, and apply to the interior with a paint brush; when dry the vessel should be thoroughly baked in a muffle or furnace.

To Enamel Copper and other Vessels.—Flint glass, 6 parts; borax, 3 parts; red lead, 1 part; oxide of tin, 1 part. Mix all together, frit, grind into powder, make into a thin paste with water, apply with a brush to the surface of the vessels, after scaling by heat and cleaning them, repeat with a second or even a third coat; afterwards dry, and lastly fuse on by heat of an enamelled kiln.

To Weld Steel Axles.—To insure a good weld, prepare the composition described on page 604 for welding cast steel. Use a strong fire, and when the axle is brought to what may be termed a bright red heat, apply a sufficiency of the composition and return it to the fire until the heat is regained, once more, then place it under the hammer. Be careful not to put on too much of the composition; otherwise it might waste in the fire, and by its affinity for metal obstruct the tweer iron, thereby preventing the fire from receiving the full energy of the blast, and thus retarding if not spoiling the job.

Compression of an India-rubber Buffer of 3-ins. Stroke.—1 ton, 1.3 inches; 1½ tons, 1¾ inches; 2 tons, 2 inches; 3 tons, 2⅜ inches; 5 tons, 2¾ inches; 10 tons, 3 inches.

To Prevent Iron Rusting.—Give it a coat of linseed oil and whiting mixed together in the form of a paste. It is easily removed and will preserve iron from rusting for years.

To Coat Iron with Emery.—Give the iron a good coat of oil and white lead; when this gets hard and dry, apply a mixture of glue and emery.

Squaring or Facing up Cast Iron Surfaces.—A round end tool is best for this. A rough chip should first be taken off, over the entire surface to faced. Then speed your lathe up and taking a light chip, merely enough to take out the first tool mark, run over the entire surface again. In turning up surfaces it is always best to begin at the centre and feed out, as the tool cuts freer and will wear twice as long.

Writing Inscriptions on Metals.—Take ½ lb. of nitric acid and 1 oz. of muriatic acid. Mix, shake well together, and it is ready for use. Cover the place you wish to mark with melted beeswax; when cold, write your inscription plainly in the wax clear to the metal with a sharp instrument; then apply the mixed acids with a feather, carefully filling each letter. Let it remain from 1 to 10 minutes, according to appearance desired; then throw on water, which stops the process, and remove the wax.

Etching Fluids.—*For copper.* Aquafortis, 2 ozs.; water, 5 ozs. *For steel.*—Iodine, 1 oz.; iron filings, ½ dr.; water, 4 ozs. Digest till the iron is dissolved. *For fine touches.*—Dissolve 4 parts each of verdigris, sea salt, and sal-ammoniac, in 8 parts vinegar, add 16 parts water; boil for a minute, and let it cool.

Engravers' Border Wax.—Beeswax, 1 part; pitch, 2 parts; tallow, 1 part. Mix. *Engraver's cement.*—Rosin, 1 part; brick dust, 1 part. Mix with heat.

Moulds and Dies.—Copper, zinc, and silver in equal proportions; melt together under a coat of powdered charcoal, and mould into the form you desire. Bring them to nearly a white heat, and lay on the thing you would take the impression of, press with sufficient force, and you will get a perfect and beautiful impression.

Polishing Powder for Specula.—Precipitate a dilute solution of sulphate of iron by ammonia in excess; wash the precipitate; press it in a screw press till nearly dry; then expose it to heat until it appears of a dull red color in the dark.

To Engrave on Copper. New Method.—Coat the copper with any of the silvering solutions discovered in this work, cover this with colored varnish, then draw the lines with a sharp point in the manner of using a diamond for stone engraving, and etch them in with perchloride of iron.

Cast Engravings.—Take the engraved plate you wish to copy and arrange a support of suitable materials round it: then pour on it the following alloy in a state of perfect fusion; tin, 1 part; lead, 64 parts; antimony, 12 parts. These "cast plates" may be worked off on a common printing press, and offer a ready mode of procuring cheap copies of the works of our celebrated artists.

Good Brass for Machinery.—1. Copper, 2 lbs.; tin, 2½ ozs.; zinc, ½ oz. 2. *Tough Brass.*—Copper, 10 ozs.; tin, 1½ ozs.; zinc, 1½ ozs. 3. *Wheels and Valves.*—Copper, 90 lbs.; tin, 10 lbs. 4. *Brass, very tenacious.*—Copper, 88.9 parts; tin, 8.3 parts; zinc, 2.8 parts. 5. *Lathe Bushes.*—Copper, 80 parts; tin, 20 parts. 6. *Machinery Bearings.*—Copper, 88 parts; tin, 12 parts. 7. *Boxes for Engines Running at High Speed.*—Copper, 7 lbs.; tin, 1 lb.; add spelter, 1 lb. to every 40 lbs. of the mixture. Use steel piston rods for high speed and lignum vitæ or apple-tree wood for *shoes* or *gibbs* on the crossheads. Iron for cylinders and guides, if made from pig iron should be melted at least 8 or 9 times previous to use.

Bronze.—1. Copper, 83 parts; zinc, 11 parts; tin, 4 parts; lead, 2 parts; mix. 2. Copper, 14 parts; melt and add zinc, 6 parts; tin, 4 parts; mix. 3. *Ancient Bronze.*—Copper, 100 parts; lead and tin, of each, 7 parts; mix. 4. *Alloy for Bronze Ornaments.*—Copper, 82 parts; zinc, 18 parts; tin, 3 parts; lead, 3 parts; mix. 5. *Statuary Bronze.*—Copper, 88 parts; tin, 9 parts; zinc, 2 parts; lead, 1 part. 6. *Another.*—Copper, 82½ parts; tin, 5 parts; zinc, 10½ parts; lead, 2 parts. 7. *Another.*—Copper, 90 parts; tin, 9 parts; lead, 1 part. 8. *Bronze for Medals.*—Copper, 89 parts; tin, 8 parts; zinc, 3 parts. 9. *Bronze.*—Copper, 7 lbs.; zinc, 3 lbs.; tin, 2 lbs. 10. *Another.*—Copper, 1 lb.; zinc, 12 lbs.; tin, 8 lbs.

Superior Bell Metal.—1. Copper, 100 lbs.; tin, 23 lbs. 2. Copper, 25 parts; tin, 5 parts. 3. Copper, 79 parts; tin, 26 parts; mix. 4. Copper, 78 parts; tin, 22 parts, mix. 5. *Parisian Bell Metal.*—Copper, 72 parts; tin, 26½ parts; iron, 1½ parts. Used for the bells of small ornamental clocks. 6. *Clock Bell Metal.*—Copper, 75.19 parts; tin, 24.81 parts. 7. *Bell Metal for Large Bells.*—Copper, 100 lbs.; tin, from 20 to 25 lbs. 8. *Bell Metal for Small Bells.*—Copper, 3 lbs.; tin, 1 lb. 9. *White Metal for Table Bells.*—Copper, 2.06 parts; tin, 97.31 parts; bismuth, 0.63 parts.

Yellow Brass (*for casting*).—1. Copper, 61.6 parts; zinc, 35.3 parts; lead, 2.9 parts; tin, 0.2 parts. 2. *Brass of Jemappes.*—Copper, 64.6 parts; zinc, 33.7 parts; lead, 1.4 parts; tin, 0.2 parts. 3. *Sheet of Stolberg near Aix, la Chapelle.*—Copper, 64.8 parts; zinc, 32.8 parts; lead, 2.0 parts; tin, 0.4 parts. 4. *D'Arcet's Brass for Gilding.*—Copper, 63.70 parts; zinc, 33.55 parts; lead, 0.25 parts; tin, 2.50 parts. 5. *Another.*—Copper, 64.45 parts; zinc, 32.44 parts; lead, 2.86 parts; tin, 0.25 parts. 6. *Sheet Brass of Romilly.*—Copper, 70.1 parts; zinc, 29.9 parts. 7. *English Brass Wire.*—Copper, 70.29 parts; zinc, 29.26 parts; lead, 0.28; tin, 0.17 parts. 9. *Augsburg Brass Wire.* Copper, 78.89 parts; zinc, 27.63 parts; tin, 0.85 parts.

Red Brass, for Gilt Articles.—1. Copper, 82.0 parts; zinc, 18.0 parts; lead, 1.5 parts; tin, 3.0 parts. 2. *Another.*—Copper, 82 parts; zinc, 18 parts; lead, 3 parts; tin, 1 part. 3. *Another.*—Copper, 82.3 parts; zinc, 17.5 parts; tin, 0.2 parts. 4. *French Tombac for Sword Handles.*—Copper, 80 parts; zinc, 17 parts; tin, 3 parts. 5. *For Parisian Ornaments.*—Copper, 85 parts; zinc, 15 parts; tin, a trace. 6. *Used for German Ornaments.*—Copper, 85.3 parts; zinc, 14.7 parts. 7. *Chrysochalk.*—Copper, 90.0 parts; zinc, 7.9 parts; lead, 1.6 parts. 8. *Red Tombac from Paris.*—Copper, 92 parts; zinc, 8 parts.

Brass.—1. *Yellow Brass for Turning* (common article).—Copper, 20 lbs.; zinc, 10 lbs.; lead, 4 ozs. 2. *Another Brass for Turning.*—Copper, 32 lbs.;

zinc, 10 lbs.; lead, 1 lb. 3. *Red Brass free, for Turning.*—Copper, 160 lbs.; zinc, 50 lbs.; lead, 10 lbs.; antimony, 44 ozs. 4. *Best Red Brass for fine Castings.*—Copper, 24 lbs.; zinc, 5 lbs.; bismuth, 1 oz. 5. *Red Tombac.*—Copper, 10 lbs.; zinc, 1 lb. 6. *Tombac.*—Copper, 16 lbs.; tin, 1 lb.; zinc, 1 lb. 7. *Brass for Heavy Castings.*—Copper, 6 to 7 parts; tin, 1 part; zinc, 1 part. 8. *Malleable Brass.*—Copper, 70.10 parts; zinc, 29.90 parts. 9. *Superior Malleable Brass.*—Copper, 60 parts; zinc, 40 parts. 10. *Brass.*—Copper, 73 parts; zinc, 27 parts. 11. Copper, 65 parts; zinc, 35 parts. 12. Copper, 70 parts; zinc, 30 parts. 13. *German Brass.*—Copper, 1 lb.; zinc, 1 lb. 14. *Watchmakers' Brass.*—Copper, 1 part; zinc, 2 parts. 15. *Brass for Wire.*—Copper, 34 parts; calamine, 56 parts. 16. *Brass for Tubes.*—Copper, 2 parts; zinc, 1 part. 17. *Brass for Heavy Work.*—Copper, 100 parts; tin, 15 parts; zinc, 15 parts. 18. *Another.*—Copper, 112 parts; tin, 13 parts; zinc, 1 part. 19. *Tombac or Red Brass.*—Copper, 8 parts; zinc, 1 part. 20. *Brass.*—Copper, 3 parts; melt, then add zinc, 1 part. 21. *Buttonmakers' Fine Brass.*—Brass, 8 parts; zinc, 5 parts. 22. *Buttonmakers' Common Brass.*—Button brass, 6 parts; tin, 1 part; lead, 1 part; mix. 23. *Mallet's Brass.*—Copper, 25.4; zinc, 74.6; used to preserve iron from oxydizing. 24. *Best Brass for Clocks.*—Rose copper, 85 parts; zinc, 14 parts; lead, 1 part.

Good Britannia Metal.—1. Tin, 150 lbs.; copper, 3 lbs.; antimony, 10 lbs. 2. *Britannia*, 2d *Quality.*—Tin, 140 lbs.; Copper, 3 lbs.; antimony, 9 lbs. 3. *Britannia Metal, for Casting.*—Tin, 210 lbs.; copper, 4 lbs.; antimony, 12 lbs. 4. *Britannia Metal for spinning.*—Tin, 100 lbs.; Britannia hardening, 4 lbs.; antimony, 4 lbs. 5. *Britannia Metal for Registers.*—Tin, 140 lbs.; hardening, 8 lbs.; antimony, 8 lbs. 6. *Best Britannia for spouts.*—Tin, 140 lbs.; copper, 3 lbs.; antimony, 6 lbs. 7. *Best Britannia for spoons.*—Tin, 100 lbs., hardening, 5 lbs.; antimony, 10 lbs. 8. *Best Britannia for Handles.*—Tin, 140 lbs.; copper, 2 lbs.; antimony, 5 lbs. 9. *Best Britannia for Lamps, Pillars, and Spouts.*—Tin, 300 lbs.; copper, 4 lbs.; antimony, 15 lbs. 10. *For Casting.*—Tin, 100 lbs.; hardening, 5 lbs.; antimony, 5 lbs. 11. Tin, 82 parts; lead, 18 parts; brass, 5 parts; antimony, 5 parts; mix. 12 *Another Britannia.*—Tin, 20 parts; antimony, 4 parts; brass, 1 part; mix. 13. *Hardening for Britannia.*—Brass, 4 parts; tin, 4 parts; when fused, add bismuth, 4, and antimony, 4 parts. *Another Hardening.*—Antimony, tin, bismuth, and plate brass, of each, equal parts. Add this mixture to melted tin until it acquires the proper color and hardness. 15. *Britannia.*—Tin, 89.70 parts; antimony, 9.70 parts; copper, 0.30 parts; zinc, 0.30 parts. 16. Tin, 81.64 parts; antimony, 16.51 parts; copper, 1.85 parts. 17. Tin, 89.97 parts; antimony, 9.12 parts; copper, 0.91 parts. 18. Tin, 90.00 parts; antimony, 10 parts. 19. Tin, 89.30 parts; antimony, 7.14 parts; copper, 1.78 parts; bismuth, 1.78 parts

German Silver, First quality for Casting.—1. Copper, 50 lbs.; zinc, 25 lbs.; nickel, 25 lbs. 2. *Second Quality, for Casting.*—Copper, 50 lbs.; zinc, 20 lbs.; best pulverized nickel, 10 lbs. 3. *German Silver for Rolling.*—Copper, 60 lbs.; zinc, 20 lbs.; nickel, 25 lbs. 4. *German Silver for Bells and other Castings.*—Copper, 60 lbs.; zinc, 20 lbs.; nickel, 20 lbs.; lead, 3 lbs.; iron, that of tin plate is the best, 2 lbs. 5. *German Silver for Castings.*—Lead, 3 parts; nickel, 20 parts; zinc, 20 parts; copper, 60 parts; mix. 6. *German Silver for Rolling.*—Nickel, 5 parts; zinc, 4 parts; copper, 12 parts; mix. 7. Copper, 40.62 parts; zinc, 43.76 parts; nickel, 15.62 parts. 8. Copper, 41.47 parts; zinc, 26.08 parts; nickel, 32.35 parts. 9. Copper, 55.55 parts; zinc, 5.55 parts; nickel, 38.90 parts. 10. Copper, 53.40 parts; zinc, 29.10 parts; nickel, 17.50 parts. 11. *Alfenide*—Contains a trace of iron, copper, 59.60 parts; zinc, 30.30 parts; nickel, 10.10 parts. 12. *Fine Silver Colored Metal.*—Tin, 100 lbs.; antimony, 8 lbs.; copper, 4 lbs.; bismuth, 1 lb. 13. *Fine White German Silver.*—Iron, 1 part; nickel, 10 parts; zinc, 10 parts; copper, 20 parts; melt. 14. *Genuine German Silver.*—Iron, 2½ parts; nickel, 31½ parts; zinc, 25½ parts; copper, 40½ parts; melt. 15. *Bidery.*—Copper, 48.48 parts; tin, 6.60 parts; zinc, 33.80 parts; lead, 12.12 parts.

Sundry Compositions.—1. *Organ Pipe Metal* consists of lead alloyed

with about half its quantity of tin to harden it. Lead, 100; tin, 33 parts; and lead, 100; tin, 20 parts, answer very well. The mottled or crystalline appearance so much admired shows an abundance of tin. 2. *Cannon Metal.*—Tin, 10 parts; copper, 90 parts; melt. 3. *Alloy for Cymbals.*—Copper, 80 parts; tin, 20 parts. 4. *Chinese Gong Metal.*—Copper, 78 parts; tin, 22 parts. 5. *Cock Metal.*—Copper, 20 lbs.; lead, 8 lbs.; litharge, 1 oz.; antimony, 3 ozs. 6. *Metal for taking Impressions.*—Lead, 3 lbs.; tin, 2 lbs.; bismuth, 5 lbs. 7. *Alloy for Gun Mountings.*—Copper, 80 parts; tin, 3 parts; zinc, 17 parts. 8. *Pinchbeck.*—Copper, 5 lbs.; zinc, 1 lb. 9. *Spanish Tutania.*—Iron or steel, 8 ozs.; antimony, 16 ozs.; nitre, 3 ozs. Melt and harden 8 ozs. of tin with 1 oz. of the above compound. 10. *Rivet Metal.*—Copper, 32 ozs.; tin, 2 ozs.; zinc, 1 oz. 11. *Chinese White Copper.*—Copper, 40.4; nickel, 31.6; zinc, 25.4; and iron, 2.6 parts. 12. *Bath Metal.*—Brass, 32 parts; zinc, 9 parts. 13. *Speculum Metal.*—Copper, 6; tin, 2; arsenic, 1 part. Or copper, 7; zinc, 3; and tin, 4 parts. 14. *Electrum.*—Copper, 8; nickel, 4; zinc, 3½ parts. This compound is unsurpassed for ease of workmanship and beauty of appearance. 15. *Common Pewter.*—Tin, 4; lead, 1 part. 16. *Best Pewter.*—Tin, 100; antimony, 17 parts. 17. *Queen's Metal.*—Tin, 9; antimony, 1; bismuth, 1; lead, 1 part. 18. *Chantry's Hard Alloy.*—Copper, 1 lb.; zinc, 2½ ozs.; tin, 2½ ozs. Razors as hard as tempered steel have been made from this alloy. 19. *Alloy for Mechanical Instruments.*—Copper, 1 lb.; tin, 1 oz. 20. *Rivet Metal for Hose.*—Tin, 46 lbs.; copper, 1 lb. 21. *Hard White Metal.*—Sheet brass, 32 ozs.; lead, 2 ozs.; tin, 2 ozs.; zinc, 1 oz. 22. *Fusible Alloy, melts in Boiling water.*—Bismuth, 8 ozs.; tin, 3 ozs.; lead, 5 ozs. 23. *Fusible Alloy for Silvering Glass.*—Tin, 6 ozs.; lead, 10 ozs.; bismuth, 21 ozs.; mercury, a small quantity. 24. *Hard White Metal for Buttons.*—Brass, 1 lb., zinc, 2 ozs.; tin, 1 oz. 25. *Button Maker's Metal.*—Copper, 43 parts; zinc, 67 parts. 26. *Another.*—Copper, 62.22 parts; tin, 2.78 parts; zinc, 35 parts. 27. *Another.*—Copper, 58.94 parts; tin, 5.28 parts; zinc, 35.78 parts. 28. *Metal that expands in cooling.*—Lead, 9; antimony, 2; bismuth, 1 part. This metal is very useful in filling small defects in iron castings, &c. 29. *Albata Metal.*—Nickel, 3 to 4 parts; copper, 20 parts; zinc, 16 parts. Used for plated goods. 30. *Birmingham Platin.*—Copper, 8 parts; zinc, 5 parts. 31. *Imitation Platinum.*—Melt together, 8 parts brass, 5 parts of zinc. This alloy closely resembles platinum. 32. *Chinese Silver.*—Silver, 2.5; copper, 65.24; zinc 19.52; cobalt or iron, 0.12; nickel, 13. 33. *Tutenag.*—Copper, 8; zinc, 5; nickel, 8 parts. 34. *Prince's Metal*—Copper, 3 parts; zinc, 1 part. 35. *Another.*—Brass, 8 parts; zinc, 1 part. 36. *Another.*—Zinc and copper, equal parts, mix. 37. *Queen's Metal.*—Lead, 1 part; bismuth, 1 part; antimony, 1 part; tin, 9 parts. Mix. 38. *Another.*—Tin, 9 parts; bismuth, 1 part; lead, 2 parts; antimony, 1 part; mix. 39. *Imitation Gold.*—Platina, 8 parts; silver, 4 parts; copper, 12 parts, melt. 40. *Imitation Silver.*—Block tin, 100 parts; antimony, 8 parts; bismuth, 1 part; copper, 4 parts; melt. 41. *Spurious Silver Leaf.*—Tin, 90.09; zinc, 9.91 parts; melt. 42. *Mirrors of Reflecting Telescope.*—Copper, 100; tin, 50 parts. 43. *White Argentine.*—Copper, 8 parts; nickel, 3 parts; zinc, 35 parts. This beautiful composition is in imitation of silver. 44. *Yellow Dipping Metal.*—Copper, any desired quantity and 6 or 7 ozs. of zinc to every lb. of copper. 45. *Shot Metal.*—Lead, 97.06 parts; arsenic, 2.94 parts. *Another.*—Lead, 89.60 parts; arsenic, 0.40 parts. 46. *White Metal.*—Parts by weight; tin, 82; lead, 18; antimony, 5; zinc, 1; copper, 5. 47. *Hard Pewter.*—Melt together, 12 lbs. of tin; regulus of antimony, 1 lb.; copper, 4 ozs. 48. *Common Pewter.*—Melt in a crucible, tin, 7 lbs.; when fused throw in lead, 1 lb.; copper, 6 ozs.; zinc, 2 ozs. 49. *British Plate.*—Nickel, 5 to 6 parts; copper, 20 parts; zinc, 8 to 10 parts. Used for plated goods. 50. *Composition for Strong Pumps, &c.*—Copper, 1 lb.; zinc, ½, and tin, 1½ ozs. 51. *Composition for Toothed Wheels.*—Copper, 1 lb.; brass, 2 ozs.; tin, 2 ozs. 52. *Another.*—Copper, 1 lb.; brass, 2 ozs.; tin, 1¼ ozs. 53. *For Turning Work.*—Copper, 1 lb.; brass, 2 ozs.; tin, 2 ozs. 54. *For Nuts of coarse Threads and Bearings.*—Copper, 1 lb.; brass, 1½ ozs.; tin, 2¼ ozs. 55. *Pewterers Temper.*—Copper, 1 lb.; tin, 2 lbs. Used to add in

small quantities to tin. 56. *Alloy for Cylinders of Locomotives.*—Copper, 88.63 parts; tin, 2.38 parts; zinc, 6.99 parts. 57. *Metal for Sliding Levers of Locomotives.*—Copper, 85.25 parts; tin, 12.75 parts; zinc, 2.00 parts. 58. *Another (Fenton's).*—Copper, 5.50; tin, 14.50; zinc, 80 parts. 59. *Baron Wetterstedt's Patent Sheathing for Ships.*—Consists of lead with from 2 to 8 per cent. of antimony, about 3 per cent. is the usual quantity. The alloy is rolled into sheets. 60. *Muntz Metal for Ships.*—Best selected copper, 60 parts; best zinc, 40 parts. Melt together in the usual manner and roll into sheets of suitable thickness. This composition resists oxidation from exposure to sea water, and prevents the adhesion of barnacles. 61. *Metal for Anatomical Injections.*—Tin, 16.41 parts; lead, 9.24 parts; bismuth, 27.81 parts; mercury, 41.41 parts. 62. *Fusible Metal for casts.*—Bismuth, 8 parts; lead, 5 parts; tin, 3 parts. It will melt at 200° or under boiling water. For male casts use tin only. 63. *Pot Metal.*—Copper, 40 lbs; lead, 16 lbs.; tin, 1½ lbs. 64. *Metal for Models.*—Tea lead, 6 lbs.; tin, ½ lb.; antimony, ½ lb. 65. *Imitation of Silver.*—Copper, 1 lb.; tin, 3 ozs. 66. *Von Bibra's Alloy for Medals.*—Bismuth, 27.27 parts; lead, 59.09 parts; tin, 13.46 parts. If the cast objects be bitten with diluted nitric acid, washed with water, and rubbed with a woollen rag, the elevated spots become bright, while the sunken portions are dull and the castings acquire a dark grey appearance with an antique lustre. Without biting the color is light grey. 67. *New Sheathing Metal.*—This alloy is made by melting 2½ parts of copper in one crucible, in another, 9 parts of zinc, 87 of lead, 1 part of mercury, and ½ part of bismuth, then mix the contents of both crucibles, covering the surface with charcoal dust, and stirring well till all are incorporated. The mercury in this alloy protects both the zinc and copper from the action of sea water. The contents of the crucibles are run into ingots and rolled into sheets. 68. *Spelter.*—Natural impure zinc, which contains a portion of lead, iron, copper and a little manganese and plumbago.

Amalgam for Mirrors.—1. Tin, 70 parts; mercury, 30 parts: 2. (*For curved mirrors*) Tin, 80 parts; mercury, 20 parts; 3. Tin, 8.33 parts; lead, 8.34 parts; bismuth, 8.33 parts; mercury, 75 parts. 4. (*For Spherical Mirrors*) Bismuth, 80 parts; mercury, 26 parts.

Reflector Metal.—1. (*Duppler's*) Zinc, 20 parts; silver, 80 parts; 2. Copper, 66.22 parts; tin, 33.11 parts; arsenic, 0.67 parts; 3. (*Cooper's.*) Copper, 57.86 parts; tin, 27.28 parts; zinc, 3.30 parts; arsenic, 1.65 parts; platinum, 9.91 parts; 4. Copper, 64 parts; tin, 32.00 parts; arsenic, 4.00 parts. 5. Copper, 82.18 parts; lead, 9.22 parts; antimony, 8.60 parts. 6. (*Little's*) Copper, 69.01 parts; tin, 30.82 parts; zinc, 2.44 parts; arsenic, 1.83 parts.

Metal for Gilt Wares.—1. Copper, 78.47 parts; tin, 2.87 parts; zinc, 17.23 parts; lead, 1.43 parts. 2. Copper, 64.33 parts; tin, 0.25 parts; zinc, 32.44 parts; lead, 2.86 parts. 3. Copper, 72.43 parts; tin, 1.87 parts; zinc, 22.75 parts; lead, 2.96 parts. 4. Copper, 70.90 parts; tin, 2.00 parts; zinc, 24.05 parts; lead, 3.05 parts.

Amalgam for Electrical Machines.—1. Tin, 25 parts; zinc, 25 parts; mercury, 50 parts. 2. Tin, 11.11 parts; zinc, 22.22 parts; mercury, 66.67 parts.

Type Metal.—1. *For smallest and most brittle types.*—Lead, 3 parts; antimony, 1 part. 2. *For small, hard, brittle type.*—Lead, 4 parts; antimony, 1 part. 3. *For types of medium size.*—Lead, 5 parts; antimony, 1 part. 4. *For large types.*—Lead, 7 parts; antimony, 1 part. 5. *For largest and softest types.*—Lead, 7 parts; antimony, 1 part. In addition to lead and antimony, type metal also contains 4 to 8 per cent. of tin, and sometimes 1 to 2 per cent. of copper. 6. *Stereotype plates* are made of lead, 20 parts; antimony, 4 parts; tin, 1 part. 7. *Another do.*—Lead, 25 parts; antimony, 4 parts; tin, 1 part. 8. *Type metal.*—Lead, 4 parts; antimony, 2 parts. 9. *Tough type metal.*—Lead, 100 parts; antimony, 32 parts; tin, 8 parts.

Dowlais Iron Works, (*England.*) *Furnaces.*—Eight, diameter 16 to 18 feet, 1300 Tons Forge Iron per week; discharging 44,000 cubic feet of air

minute. *Engine (non-condensing). Cylinder*, 55 ins. in diam. by 13 feet stroke of piston. *Pressure of steam*, 60 lbs. per square inch, cut off at ⅓ the stroke of the piston. *Valves*, 120 ins. in area. *Boilers*. Eight. (Cylindrical flue, internal furnace,) 7 feet in diam. and 42 feet in length; one flue, 4 ft. in diam. *Grates*, 288 square feet. *Fly wheel*. Diam. 22 feet, weight, 25 tons. *Blowing Cylinder*, 144 ins. diam. by 12 ft. stroke of piston. *Revolutions*, 20 per minute. *Blast*, 3¼ lbs. per square inch. *Discharge pipe*, diam. 5 ft. and 420 feet in length. *Valves*, Exhaust, 56 square feet, delivery, 16 square feet.

ORMOLU COLORING, LACQUERS, &C.—18 KINDS.—*Ormolu Coloring.*—1. Alum, 30 parts: nitrate of potassa, 30 parts; red ochre, 30 parts; sulphate of zinc, 8 parts; common salt, 1 part; sulphate of iron, 1 part. It is applied with a soft brush. The articles are placed over a clear charcoal fire until the salts, melted and dried, assume a brown aspect. They are then suddenly cooled in nitric acid water, containing 3 per cent. of hydrochloric acid, afterwards washed in abundance of water and dried in sawdust. 2. *To Prepare Brass Work for Ormolu Dipping.*—If the work is oily, boil it in lye, and if it is finished work, filed or turned, dip it in old acid, and it is then ready to be ormolued, but if it is unfinished and free from oil, pickle it in strong sulphuric acid, dip in pure nitric acid, and then in the old acid, after which it will be ready for ormoluing. 3. *To Repair Old Nitric Acid Ormolu Dips.*—If the work after dipping appears coarse and spotted, add vitriol till it answers the purpose: if the work after dipping appears too smooth, add muriatic acid and nitre till it gives the right appearance. The other ormolu dips should be repaired according to the receipts, putting in the proper ingredients to strengthen them. They should not be allowed to settle, but should be stirred often while using. 4. *Directions for making Lacquer.*—Mix the ingredients, and let the vessel containing them stand in the sun, or in a place slightly warmed, 3 or 4 days, shaking it frequently till gum is dissolved, after which let it settle from 24 to 48 hours, when the clear liquor may be poured off for use. Pulverized glass is sometimes used in making lacquer to carry down the impurities. 5. *Lacquer for Dipped Brass.*—Alcohol (95 per cent.), 2 gals.; seed lac, 1 lb.; gum copal, 1 oz.; English saffron, 1 oz.; annatto, 1 oz. 6. *Lacquer for Bronzed Brass.*—To 1 pt. of the above lacquer add gamboge, 1 oz., and, after mixing it, add an equal quantity of the first lacquer. 7. *Deep Gold Colored Lacquer.*—Best alcohol, 4 ozs.; Spanish annatto, 8 ozs.; turmeric, 2 drs.; shellac, ½ oz.; red sanders, 12 grs.; when dissolved, add spts. of turpentine, 30 drops. 8. *Deep Gold Colored Lacquer for Brass not Dipped.*—Alcohol, 4 gals.; turmeric, 3 lbs.; gamboge, 3 ozs.; gum sandarac, 7 lbs.; shellac, 1½ lbs.; turpentine varnish, 1 pt. 9. *Gold Colored Lacquer for Dipped Brass.*—Alcohol, 36 ozs.; seed lac, 6 ozs.; amber, 2 ozs.; gum gutta, 2 ozs.; red sandal wood, 24 grs.; dragon's blood, 60 grs.; oriental saffron, 36 grs.; pulverized glass, 4 ozs. 10. *Gold Lacquer for Brass.*—Seed lac, 6 ozs.; amber or copal, 2 ozs.; best alcohol, 4 gals.; pulverized glass, 4 ozs.; dragon's blood, 40 grs.; extract of red sandal wood obtained by water, 30 grs. 11. *Lacquer, for Dipped Brass.*—Alcohol, 12 gals.; seed lac, 8 lbs.; turmeric, 1 lb. to a gal. of the above mixture; Spanish saffron, 4 ozs. The saffron is to be added for bronzed work. 12. *Good Lacquer.*—Alcohol, 8 ozs.; gamboge, 1 oz.; shellac, 3 ozs.; annatto, 1 oz.; solution of 3 ozs. of seed lac in 1 pt. alcohol. When dissolved, add ½ oz. Venice turpentine, ¼ oz. dragon's blood, will make it dark. Keep it in a warm place 4 or 5 days. 13. *Pale Lacquer, for Tin Plate.*—Best alcohol, 8 ozs.; turmeric, 4 drs.; hay saffron, 2 scrs.; dragon's blood, 4 scrs.; red sanders, 1 scr.; shellac, 1 oz.; gum sandarac, 2 drs.; gum mastic, 2 drs. Canada balsam, 2 drs.; when dissolved, add spts. turpentine, 80 drops. 14. *Red Lacquer for Brass.*—Alcohol, 8 gals.; dragon's blood, 4 lbs.; Spanish annatto, 12 lbs.; gum sandarac, 13 lbs.; turpentine, 1 gal. 15. *Pale Lacquer, for Brass.*—Alcohol, 2 gals.; cape aloes, cut small, 3 ozs.; pale shellac, 1 lb.; gamboge, 1 oz. 16. *Best Lacquer for Brass.*—Alcohol, 4 gals.; shellac, 2 lbs.; amber gum, 1 lb.;

copal, 20 ozs.; seed lac, 3 lbs.; saffron to color; pulverized glass, 8 ozs. 17. *Color for Lacquer.*—Alcohol, 1 qt.; annatto, 4 ozs. 18. *Gilder's Pickle.*—Alum and common salt, each, 1 oz.; nitre, 2 ozs.; dissolved in water, ½ pt. Used to impart a rich yellow color to gold surfaces. It is best largely diluted with water.

Bronzing Compositions, 32 kinds.—1. *Silver White Bronzing Powder.*—Melt together 1 oz. each, bismuth and tin, then add 1 oz. quicksilver, cool and powder. 2. *Gold colored Bronze.*—Verdigris, 8 ozs.; tutty powder, 4 ozs.; borax and nitre, of each 2 ozs.; bichloride of mercury, ½ oz.; make into a paste with oil and fuse them together. Used in japanning as a gold color. 3. *Beautiful Red Bronze Powder.*—Sulphate of copper, 100 parts; carbonate of soda, 60 parts; apply heat until they unite into a mass. 4. *Acid Bronze.*—Cobalt, 4 lbs.; pulverize; sift through a fine sieve; put in a stone pot; add ½ gal. nitric acid, a little at a time, stirring frequently for 24 hours; then add about, 5 gals. muriatic acid, or until the work comes out a dark brown. 5. *Alkali Bronze.*—Dissolve 5 lbs. nitrate of copper in 3 gals. of water; and 5 lbs. pearlash; add 1 or 2 pts. potash water; then add from 2 to 3 lbs. sal ammoniac or until the work comes out the required color. 6. *Coating Dip.*—Sulphate of zinc, 8 lbs.; oil of vitriol, 5 gals.; aquafortis, ¾ gal.; To use, warm up scalding hot. 7. *Quick Bright Dipping Acid, for Brass which has been Ormolued.*—Sulphuric acid 1 gal.; nitric acid, 1 gal. 8. *Dipping Acid.*—Sulphuric acid, 12 lbs.; nitric acid, 1 pt.; nitre, 4 lbs.; soot, 2 handfuls; brimstone, 2 ozs.; pulverize the brimstone and soak it in water 1 hour, add the nitric acid last. 9. *Good Dipping Acid for cast Brass.*—Sulphuric acid, 1 qt.; nitre, 1 qt.; a little muriatic acid may be added or omitted. 10. *Ormolu Dipping Acid for Sheet Brass.*—Sulphuric acid, 2 gals.; nitric acid, 1 pt.; muriatic acid, 1 pt.; nitre, 12 lbs.; put in the muriatic acid last, a little at a time, and stirring the mixture with a stick. 11. *Dipping Acid.*—Sulphuric acid, 4 gals.; nitric acid, 2 gals.; saturated solution of sulphate of iron, 1 pt.; solution of sulphate of copper, 1 qt. 12. *Ormolu Dipping Acid for cast Brass.*—Sulphuric acid, 1 gal.; sal ammoniac, 1 oz.; sulphur (in flour), 1 oz.; blue vitriol, 1 oz.; saturated solution of zinc in nitric acid, 1 gal.; mixed with an equal quantity of sulphuric acid. 13. *Vinegar Bronze for Brass.*—Vinegar, 10 gals.; blue vitriol, 3 lbs.; muriatic acid, 3 lbs.; corrosive sublimate, 4 ozs.; sal-ammoniac, 2 lbs.; alum, 8 ozs. 14. *Antique Bronze Paint.*—Sal-ammoniac, 1 oz.; cream of tartar, 3 ozs.; common salt, 6 ozs.; dissolve in 1 pt. hot water; then add nitrate of copper, 2 ozs.; dissolve in ½ pt. water; mix well and apply it to the article in a damp place with a brush. 15. *Blue Bronze on Copper.*—Clean and polish well, then cover the surface with a fluid obtained by dissolving vermilion in a warm solution of sodium, to which some caustic potash has been added. 16. *Bronze Dip.*—Sal-ammoniac, 1 oz.; salt of sorrel (binoxalate of potash), ¼ oz.; dissolved in vinegar. 17. *Parisian Bronze Dip.*—Sal-ammoniac, ½ oz.; common salt, ½ oz.; spirits of hartshorn, 1 oz.; dissolved in an English qt. of vinegar, a good result will be obtained by adding ½ oz. sal-ammoniac instead of spts. of hartshorn; the piece of metal being well cleaned is to be rubbed with one of these solutions, then dried by friction with a fresh brush. 18. *Green Dip.*—Wine vinegar, 2 qts.; verditer green, 2 ozs.; sal-ammoniac, 1 oz.; salt, 2 ozs.; alum, ½ oz.; French berries, 8 ozs.; boil the ingredients together. 19. *Aquafortis Dip.*—Nitric acid, 8 ozs.; muriatic acid, 1 qt.: sal-ammoniac, 2 ozs.; alum, 1 oz.; salt, 2 ozs. 20. *Olive Bronze Dip for Brass.*—Nitric acid, 3 ozs.; muriatic acid, 2 ozs.; add titanium or palladium, when the metal is dissolved add 2 gals. pure soft water to each pt. of the solution. 21. *Brown Bronze Paint for Copper Vessels.*—Tinct. of steel, 4 ozs.; spts. of nitre, 4 ozs.; blue vitriol, 1 oz.; water, ½ pt.; mix in a bottle, apply it with a fine brush, the vessel being full of boiling water. Varnish after the application of the bronze. 22. *Bronze for all kinds of Metal.*—Muriate of ammonia (sal-ammoniac), 4 drs.; oxalic acid, 1 dr.; vinegar, 1 pt.; dissolve the oxalic acid first; let the work be clean, put on the bronze with a brush, repeating the operation as many times as may be

necessary. 23 *Green Bronze.*—Dissolve 2 ozs. nitrate of iron, and 2 ozs. hyposulphate of soda in 1 pt. of water; immerse the article until the required shade is obtained, as almost any shade from brown to red can be obtained according to the time of immersion, then well wash with water, dry and brush. 24. *Pale Deep Olive Green Bronze.*—Perchloride of iron, 1 part; water, 2 parts. Mix and immerse the brass. 25. *Dark Green.*—Saturate nitric acid with copper and immerse the brass. 26. *Dead Black for Brass Work.*—Rub the surface first with tripoli, then wash it with a solution of 1 part neutral nitrate of tin, with 2 parts chloride of gold, after 10 minutes wipe it off with a wet cloth. 27. *Best Bronze for Brass.*—Take 1 lb. of nitric acid, and ½ lb. of white arsenic, put them into an earthen vessel and then proceed in the usual manner. 28. *Another Bronze for Brass.*—1 oz. muriate of ammonia, ½ oz. alum, ½ oz. arsenic, dissolve together in 1 pt. of strong vinegar. 29. *Black Dip for Brass.*—Hydrochloric acid (commonly called smoking salts), 12 lbs.; sulphate of iron, 1 lb.; and pure white arsenic, 1 lb. This dip is used in all the large factories in Birmingham, but the dip used in the London trade is 2 ozs. corrosive sublimate, in 1 pt. of the best vinegar, cork both air tight in a bottle, let it stand 24 hours; then it is fit for use. 30. *Quick Bright Dip for Brass.*—Use strong nitric acid in sufficient quantity, dip your brass in the liquid for an instant, withdraw, and immediately immerse it first in cold water, then in boiling water, for a short time only in each bath, then allow it to dry, repeat the process if necessary. 31. *Application of Bronze Powder.*—The proper way is to varnish the article and then dust the bronze powder over it after the varnish is partly dry. 32. —*Black color for Brass Work.*—Make a strong solution of nitrate of silver, in one dish and nitrate of copper, in another. Mix the two together and plunge in the brass. Now heat the brass evenly till the required degree of blackness is acquired. Unrivalled as a beautiful color on optical instruments.

Graham's Quick Bronzing Liquids.—*For immediate action on Copper, Brass or Zinc.*—1 *Brown or Dark Bronze for Copper, Brass, or Zinc.*.—Dissolve 5 drachms nitrate of iron in 1 pt. water; or, 5 drs. perchloride of iron in 1 pt. water. A black may also be obtained from 10 ozs. muriate of arsenic in 2 pts. permuriate of iron, and 1 pt. water 2. *Brown or Red Bronzing for Brass.*—Dissolve 15 drs. nitrate of iron, and 16 drs. hyposulphate of soda in 1 pt. water, or, 1 dr. nitric acid may be substituted for the nitrate of iron. 3. *Red Brown Bronzing for Brass.*—Dissolve 1 oz. nitrate of copper, and 1 oz. oxalic acid in 1 pt. water, brought to the boil and then cooled. 4. *Dark Brown Bronzing for Brass.*—Mix 1 oz. cyanide of potassium, and 3 drs. nitric acid, with 1 pt. water. 5. *Red Bronzing for Brass.* Mix 30 grs. tersulphate of arsenic, 6 drs. solution of pearlash, and 1 pt. water. 6. *Orange Bronzing on Brass.*—Mix 1 dr. potash solution of sulphur with 1 pt. water. 7. *Olive Green Bronzing for Brass.*—Dissolve 1 pt. permuriate of iron in 2 pts. water. 8. *Slate-colored Bronzing for Brass.*—Dissolve 2 drs. sulphocyanide of potassium, and 5 drs. perchloride of iron, in 1 pt. water. 9. *Steel Grey Bronzing for Brass.*—Mix 1 oz. muriate of arsenic with 1 pt. water, and use at a heat not less than 180° Fahr. 10. *Bright Red Bronzing for Copper.*—Mix 2 drs. sulphide of antimony, and 1 oz. pearlash in 1 pt. water. 11. *Dark Red Bronzing for Copper.*—Dissolve 1 dr. sulphur and 1 oz. pearlash in 1 pt. water. 12. *Copper Colored Bronzing for Zinc.*—Agitate the articles in a solution of 8 drs. sulphate of copper, and 8 drs. hyposulphate of soda in 1 pt. water.

Hardening and Filling for Fire-proof Safes.—Experience has shown that the fire and burglar-proof diamond chill for iron or steel, described in another part of this work, has no superior as a hardening for security in the construction of safes; and, as a non-conductor of heat, we would recommend a filling of plaster of Paris or alum. It is claimed by some that a mixture of both of these articles forms the best known filling for safes, as an external application of intense heat is certain to liberate a large quantity of water, which is transformed into steam, thus ensuring entire safety to the contents of the safe. Other manufacturers employ con-

crete filling for safes, and extol it very highly. Mr. Moffat, gas and steam-fitter, Boston, has informed me that he has applied for a protection in the matter of a discovery by which he claims that he can fully protect a safe against a double blast furnace heat, by means of an outside lining of bricks composed of asbestos and kaolin, a very small portion of the latter material being used. From the well known incombustible nature of these materials, there can be no reasonable doubt but that the claim in question is a just one.

Concerning Saws, Railway Springs, &c.—When the saws are wanted to be rather hard, but little of the oil tempering composition is burned off; when milder, a large portion; and for a spring temper the whole is allowed to burn away. Saws as well as springs appear to lose their elasticity, after hardening and tempering, from the reduction they undergo in grinding and polishing. Towards the conclusion of the manufacture, the elasticity of the saw is restored principally by hammering, and partly over a clear coke fire to a straw color; the tint is removed by very diluted muriatic acid, after which the saws are well washed in plain water and dried. Spring manufacture includes the heaviest specimens of hardened steel works uncombined with iron; for example, bow-springs for all kinds of vehicles, some intended for railway use measure 3½ feet long, and weigh 50 lbs. each piece, two of these are used in combination; other single springs are 6 feet long; and weigh 70 lbs. The principle of these bow-springs will be immediately seen by conceiving the common archery bow fixed horizontally with its cord upwards: the body of the carriage being attached to the cord sways both perpendicularly and sideways with perfect freedom. In hardening them they are heated by being drawn backwards and forwards through an ordinary fire built hollow, and they are immersed in a trough of plain water. In tempering them they are heated until the black red is just visible at night; by daylight the heat is denoted by its making a piece of wood sparkle when rubbed on the spring, which is then allowed to cool in the air. The metal is nine-sixteenths of an inch thick, and some consider five-eighths the limits to which steel will harden properly, that is sufficiently alike to serve as a spring. Their elasticity is tested far beyond their intended range.

Lightning Rods.—The conditions that determine a perfect lightning conductor are that it shall expose, in some prominent position on a building-a metallic point, and that it shall offer from this point to the moist earth a path of little or no resistance to the passage of the current. The ordinary galvanized iron wire No. 4, one quarter of an inch in diameter, it is contended, is amply sufficient for any dwelling house. The precautions necessary in fixing conductors to houses are: 1. The conductor must be solid and continuous. There should be no joint, unless it be a well-soldered one. 2. The ground connection must be sound and good. 3. Each conductor, if there be more than one, should have a separate ground connection; but they should all be connected together. It is unnecessary to insulate these conductors. There should be no points or acute angle in the conductors—the straighter and more direct their course to the earth the better. It is safest to consider that the area protected by the conductor is equal to its height above the ground.

How to fit Keys into Locks.—When it is not convenient to take locks apart in the event of keys being lost, stolen, or missing, when you wish to fit a new key, take a lighted match or candle, and smoke the new key in the flame, introduce it carefully into the key-hole, press it firmly against the opposing wards of the lock, withdraw it; and the indentations in the smoked part of the key will show you exactly where to file.

Putting Machines Together.—In putting machines together no part should be finished except where it is necessary to make it fit, as it is sometimes the case that machinery is miscalculated, and by finishing it would be spoiled, while if it were not, it might be saved by slight alterations in design. And again, in finishing certain parts before you get a machine together, you are unknowingly finishing parts not necessary to be finished, and making

them of a shape anything but desirable. This rule, however, is not intended to apply to machinery being made to detail drawings.

To Repair Cracked Bells.—The discordant tones of a cracked bell being due to the jarring of the rugged uneven edges of the cracks against each other, the best remedy that can be applied is to cut a thin slit with a toothless saw driven at a very high velocity, say 300 or 400 revolutions per minute, in such a manner as to cut away the opposing edges of the fracture wherever they come in contact. This will restore the original tone of the bell.

To Break up Old Cannon.—Old cannon and massive castings may be cut in two by a continuous stream of hot molten iron, which wears away the iron as a stream of hot water would eat into a mass of ice. Or the gun may be rolled on a frame to the mouth of a furnace, and the muzzle end shoved in as far as possible among other iron, the opening filled up and luted around the gun, the end of which is melted off. At the next charge shove it in another length, and so on until the breech is disposed of.

Large masses of cast iron may be broken up by drilling a hole in the most solid part, filling it up with water, fitting a steel plug very accurately into the hole, and letting the drop of a pile driver descend on the plug.

Different Styles of Filing.—To file a surface true, it is necessary on commencing, to squeeze the file tightly between the third and fourth fingers and palm of your hand until you become used to it. Your position in filing should be half left face to your work, with the middle of your right foot fifteen inches behind your left heel; and to file your work true or square, it is necessary to reverse your work often, as by this means you are enabled to see the whole surface you are filing and see while filing, whether you are filing true or not. When, however, your work is so heavy that you cannot reverse it you had better file first to the right and then to the left, as by this means you can plainly see the file marks, and this again assists you in filing true.

To Remedy Slip of Driving Belts.—Dab on a little of the sticky oil which oozes away from the bearings of machinery.

Tarnish on Electro-Plate Goods may be removed by immersing the article from one to ten or fifteen minutes, or until the tarnish has been removed, but no longer, in the following solution: Rain water, 2 gals.; cyanuret potassa, ½ lb.; dissolve and put into a stone jug or jar and closely cork. After immersion, the articles must be taken out and thoroughly rinsed in two or three waters, then dried with a soft linen cloth, or, if frosted or chased work, with fine clean sawdust. Tarnished jewellery may be speedily restored by this process; but make sure work of removing the alkali, otherwise it will corrode the goods.

Solution for Dipping Steel Articles, Previously to Electro-Plating.—Nitrate of silver, 1 part; nitrate of mercury, 1 part; nitric acid (sp. gr., 1.384), 4 parts; water, 120 parts. *For copper articles.*—Sulphuric acid, 64 parts; water, 64 parts; nitric acid, 32 parts; muriatic acid, 1 part; mix. The article, free from grease, is dipped in the pickle for a second or two.

Coating Iron Castings With Gold or Silver.—The articles to be gilded are well cleaned and boiled in a porcelain vessel, together with 12 parts of mercury, 1 of zinc, 2 of iron vitriol, 1½ of muriatic acid of 1.2 specific gravity; and 12 parts of water; in a short time a layer of mercury will deposit upon the iron, and upon this the gold amalgam may be uniformly distributed. Iron to be silvered is first provided with a coating of copper, upon which the silver is applied either by means of amalgam or silver leaf.

Brunswick Black for Grates, &c.—Asphaltum, 5 lbs.; melt, and add boiled oil, 2 lbs.; spirits of turpentine, 1 gal. Mix.

Bronze Paint for Iron.—Ivory black, 1 oz.; chrome yellow, 1 oz.; chrome green, 2 lbs.; mix with raw linseed oil, adding a little japan to dry it, and you have a very nice bronze green. If desired, gold bronze

may be put on the prominent parts, as on the tips or edges of an iron railing where the paint is not quite dry, use a piece of velvet or plush to rub on the bronze.

TINNING IRON.—Cleanse the metal to be tinned, and rub with a coarse cloth, previously dipped in hydrochloric acid (muriatic acid,) and then rub on French putty with the same cloth. French putty is made by mixing tin filings with mercury.

TINNING.—1. Plates or vessels of brass or copper boiled with a solution of stannate of potassa, mixed with turnings of tin, become, in the course of a few minutes, covered with a firmly attached layer of pure tin. 2. A similar effect is produced by boiling the articles with tin-filings and caustic alkali, or cream of tartar. In the above way, chemical vessels made of copper or brass may be easily and perfectly tinned.

TO RECOVER THE TIN FROM OLD BRITANNIA.—Melt the metal, and while hot sprinkle sulphur over it; and stir it up for a short time, this burns the other metals out of the tin, which may then be used for any purpose desired.

KUSTITIEN'S METAL FOR TINNING.—Malleable iron, 1 lb., heat to whiteness; add 5 ozs. regulus of antimony, and Malacca tin, 24 lbs.

PREVENTING OF RUST.—Cast iron is best preserved by rubbing it with blacklead. For polished work, varnish with wax dissolved in benzine, or add a little olive oil to copal varnish and thin with spts. turpentine. To remove deep-seated rust, use benzine, and polish off with fine emery, or use tripoli, 2 parts; powdered sulphur, 1 part. Apply with soft leather. Emery and oil is also very good.

TO PURIFY ZINC.—Pure zinc may be obtained by precipitating its sulphate by an alkali, mixing the oxide thus produced with charcoal powdered, and exposing the mixture to a bright red heat in a covered crucible in which the pure metal will be found as a button at the bottom when cold.

TRANSPARENT BLUE FOR IRON OR STEEL.—Demar varnish, ½ gal.; fine ground Prussian blue, ½ oz.; mix thoroughly. Makes a splendid appearance. Excellent for blueing watch-hands.

LEAD SHOT are cast by letting the metal run through a narrow slit into a species of colander at the top of a lofty tower; the metal escapes in drops, which, for the most part, assume the spherical form before they reach the tank of water into which they fall at the foot of the tower, and this prevents their being bruised. They are afterwards riddled or sifted for size, and afterwards churned in a barrel with black lead.

PAINT FOR SHEET IRON SMOKE PIPE.—Good varnish, ½ gallon; boiled linseed oil, ½ gallon; add red lead sufficient to bring to the consistency of common paint. Apply with a brush. Applicable to any kind of iron work exposed to the weather.

TO COPPER THE SURFACE OF IRON, STEEL, OR IRON WIRE.—Have the article perfectly clean, then wash with the following solution, and it presents at once a coppered surface. Rain water, 3 lbs.; sulphate of copper. 1 lb.

LEAD PIPE, is made by forcing lead, while heated to a plastic state, over an annular mandril or die to form the core, by means of hydraulic pressure.

TO JOIN BROKEN LEAD PIPES DURING PRESSURE OF WATER.—It frequently happens that lead pipes get cut or damaged when the water is running at a high pressure, causing much trouble to make repairs, especially if the water cannot be easily turned off. In this case plug both ends of the pipe at the break, place a small pile of broken ice and salt around them. In a few minutes the water in the pipe will freeze; next, withdraw the plugs and insert a new piece of pipe; solder perfectly, thaw the ice, and it will be all right.

TO REPAIR SMALL LEAKS IN LEAD PIPES.—Place the point of a dull nail over the leak, give it a gentle tap with the hammer and the flow will cease.

TO PREVENT CORROSION IN LEAD PIPES.—Pass a strong solution of

sulphide of potassium and sodium through the inside of the pipe at a temperature of 212°, and allow it to remain about 10 or 15 minutes. It converts the inside of the pipe into an insoluble sulphide of lead and prevents corrosion.

To Bend Copper or Brass Tubes.—Run melted lead or resin into your pipe till full, and you may then bend it gradually into any desired shape; the pipe may then be heated and the lead or resin melted and run out.

To Join Lead Plates.—The joints of lead plates for some purposes are made as follows: The edges are brought together, hammered down into a sort of channel cut out of wood and secured with a few tacks. The hollow is then scraped clean with a scraper, rubbed over with candle grease, and a stream of hot lead is poured into it, the surface being afterwards smoothed with a red hot plumber's iron.

To Join Lead Pipes.—Widen out the end of one pipe with a taper wood rift, and scrape it clean inside; scrape the end of the other pipe outside a little tapered, and insert it in the former: then solder it with common lead solder as before described; or, if it requires to be strong, rub a little tallow over, and cover the joint with a ball of melted lead, holding a cloth (2 or 3 plies of greased bedtick) on the under side; and smoothing over with it and the plumber's iron.

To Prevent Lead Exploding.—Many mechanics have had their patience sorely tried when pouring melted lead around a damp or wet joint to find it explode, blow out, or scatter from the effects of steam generated by the heat of the lead. The whole trouble may be stopped by putting a piece of resin the size of the end of a man's thumb into the ladle and allowing it to melt before pouring. Simple as the secret is, many have paid $20 for the privilege of knowing it.

Tabular View of the Processes of Soldering.—*Hard Soldering.* The hard solders most commonly used are the spelter solders, and silver solders. The general flux is borax, marked A on the table, and the modes of heating are the naked fire, the furnace or muffle, and the blow pipe, marked *a*, *b*, *g*, applicable to nearly all metals less fusible than the solders; the modes of treatment are nearly similar throughout. *Note.*—The examples commence with the solders (the least fusible first) followed by the metals for which they are commonly employed. Fine gold, laminated and cut into shreds, is used as the solder for joining chemical vessels made of platinum. Silver is by many considered as much the best solder for German silver; for silver solders, see Jewellers' alloys. Copper cut in shreds, is sometimes similarly used for iron. Gold solders laminated are used for gold alloys. Spelter solders, granulated whilst hot, are used for iron, copper, brass, gun metals, German silver, &c., see below. Silver solders laminated, are employed for all silver works and for common gold work, also for German silver, gilding metals, iron, steel, brass, gun metal, &c., when greater neatness is required than is obtained from spelter solder.

White or button solders, granulated, are employed for the white alloys called button metals; they were introduced as cheap substitutes for silver solder. *Hard Soldering.*—Applicable to nearly all the metals; the modes of treatment are very different. The soft solder mostly used is two parts tin and one of lead; sometimes, from motives of economy, much more lead is employed, and 1½ tin to 1 lead is the most fusible of the group, unless bismuth is used. The fluxes B to G, and the modes of heating, *a* to *i*, are all used with the soft solders.

Note.—The examples commence with the metals to be soldered. Thus in the list, zinc, 8, *c*, *f*, implies that zinc is soldered with No. 8 alloy, by the aid of the muriate or chloride of zinc, and the copper bit. Lead, 4 to 8, F, *d*, *e*, implies that lead is soldered with alloys varying from No. 4 to 8, and that it is fluxed with tallow, the heat being applied by pouring on melted solder, and the subsequent use of the heated iron, not tinned; but in general one only of the modes of heating is selected, according to circumstances. Iron, cast-iron and steel, 8, B, D, if thick, heated by *a*, *b*, or *c*, and also by *g*

Tinned iron, 8, G, D, *f*. Gold and silver are soldered with pure tin, or else with 8, E, *a*, *g*, or *h*. Copper and many of its alloys, namely brass, gilding metal, gun metal, &c., 8, B, C, D; when thick, heated by *a*, *b*, *c*, *e*, or *g*, when thin, by *f*, or *g*. Speculum metal, 8, B, C, D, the heat should be cautiously applied; the sand bath is perhaps the best mode. Zinc, 8 C, *f*. Lead and lead pipes, or ordinary plumber's work, 4 to 8 F, *d*, or *e*. Lead and tin pipes, 8, D, and G, mixed *g*, and also *f*. Britannia metal, C, D, *g*. Pewters, the solders must vary in fusibility according to the fusibility of the metal, generally G, and *i*, are used, sometimes, also G, and *g* or *f*. Lead is united without solder by pouring on red hot lead, and employing a red hot iron, *d*, *e*. Iron and brass are sometimes burned, or united by partial fusion, by pouring very hot metal over or around them. For table of melting heats, fluxes, &c., see p. 644.

SOLDERS, 32 KINDS.—1. *Plumbers' Solder.*—Lead, 2 parts; tin, 1 part. 2. *Tinmen's Solder.*—Lead, 1 part; tin, 1 part. 3. *Zinc Solder.*—Tin, 1 part; lead, 1 to 2 parts. 4. *Pewter Solder.*—Lead, 1 part; bismuth, 1 to 2 parts. 5. *Spelter Solder.*—Equal parts copper and zinc. 6. *Pewterers' Soft Solder.*—Bismuth, 2: lead, 4; tin, 3 parts. 7. *Another.*—Bismuth, 1; lead, 1; tin, 2 parts. 8. *Another Pewter Solder.*—Tin, 2 parts; lead, 1 part. 9. *Glazier's Solder.*—Tin, 3 parts; lead, 1 part. 10. *Solder for Copper.*—Copper, 10 parts; zinc, 9 parts. 11. *Yellow Solder for Brass or Copper.*—Copper, 32 lbs.; zinc, 29 lbs; tin, 1 lb. 12. *Brass Solder.*—Copper, 61.25 parts; zinc, 38.75 parts. 13. *Brass Solder, Yellow and easily fusible.*—Copper, 45; zinc, 55 parts. 14. *Brass Solder, White.*—Copper, 57.41 parts; tin, 14.60 parts; zinc, 27.99 parts. 15. *Another Solder for Copper.*—Tin, 2 parts; lead, 1 part. When the copper is thick, heat it by a naked fire; if thin, use a tinned copper tool. Use muriate or chloride of zinc, as a flux. The same solder will do for *iron, cast iron,* or *steel*; if the pieces are thick, heat by a naked fire, or immerse in the solder. 16. *Black Solder.*—Copper, 2; zinc, 3; tin, 2 parts. 17. *Another.*—Sheet brass, 20 lbs.; tin, 6 lbs.; zinc, 1 lb. 18. *Cold Brazing without Fire or Lamp.*—Fluoric acid, 1 oz.; oxy-muriatic acid, 1 oz.; mix in a lead bottle. Put a chalk mark each side where you want to braze. This mixture will keep about 6 months in one bottle. 19. *Cold Soldering without Fire or Lamp.*—Bismuth, ½ oz.; quicksilver, ¼ oz.; block tin filings, 1 oz.; spirits salts, 1 oz.; all mixed together. 20. *To Solder Iron to Steel or either to Brass.*—Tin, 3 parts; copper, 39½ parts; zinc, 7½ parts. When applied in a molten state it will firmly unite metals first named to each other. 21. *Plumbers' Solder.*—Bismuth, 1; lead, 5; tin, 3 parts; is a first class composition. 22. *White Solder for Raised Britannia Ware.*—Tin, 100 lbs.; hardening, 8 lbs.; antimony, 8 lbs. 23. *Hardening for Britannia.*—(To be mixed separately from the other ingredients). Copper, 2 lbs.; tin, 1 lb. 24. *Best Soft Solder for Cast Britannia Ware.*—Tin, 8 lbs.; lead, 5 lbs. 25. *Bismuth Solder.*—Tin, 1; lead, 3; bismuth, 3 parts. 26. *Solder for Brass that will Stand Hammering.*—Brass, 78.26 parts; zinc, 17.41 parts; silver, 4.33 parts; add a little chloride of potassium to your borax for a flux. 27. *Solder for Steel Joints.*—Silver, 19 parts; copper, 1 part; brass, 2 parts. Melt altogether. 28. *Hard Solder.*—Copper, 2 parts; zinc, 1 part. Melt together. 29. *Solder for Brass.*—Copper, 3 parts; zinc, 1 part; with borax. 30. *Solder for Copper.*—Brass, 6 parts; zinc, 1 part; tin, 1 part; melt all together well, and pour out to cool. 31. *Solder for Platina.*—Gold with borax. 32. *Solder for Iron.*—The best solder for iron is good tough brass with a little borax.

N.B.—In soldering, the surfaces to be joined are made perfectly clean and smooth, and then covered with sal ammoniac, resin or other flux, the solder is then applied, being melted on and smoothed over by a tinned soldering iron.

SOLDERING FLUID.—Take 2 oz. muriatic acid; add zinc till bubbles cease to rise; add ½ teaspoonful of sal-ammoniac.

TEMPERING LIQUIDS.—1. Water, 3 gals.; soda, 2 ozs.; saltpetre, 2 ozs.; prussic acid, 1 oz., or oil of vitriol, 2 ozs. 2. Water, 6 gals.; saltpetre, sal-ammoniac and alum, of each, 4 ozs., and draw no temper. 3. Water, 4 gals.; saltpetre and alum, of each, 4 ozs.; sal-ammoniac, pulverized, 1 oz.; salt, 3

lbs. Heat to a cherry red and plunge in, drawing no temper. 4. Water, 4 gals.; saltpetre, 1 oz.; pulverized borax, 1 oz.; pulverized sal-ammoniac, 1 oz.; white vitriol, 2 ozs.; salt, 3 pts. Do not hammer too cold, nor heat too high. 5. Water, 4 gals.; salt, 2 teacupfuls; saltpetre, 2 ozs; pulverized alum, 4 teaspoonfuls; never heat over a cherry red, nor draw any temper. 6. Water, 2 gals.; add corrosive sublimate, 1½ ozs.; common salt, 2 handfuls; when dissolved it is ready for use. The first gives toughness to the steel, while the latter gives the hardness, causing the water to adhere to the steel, which otherwise would be repelled by the heat. 7. *Tempering Liquid for Mill Picks.*—Water, 3 gals.; spts. of nitre, 3 ozs.; hartshorn, 3 ozs.; white vitriol, 3 ozs.; alum, 3 ozs.; sal-ammoniac, 3 ozs.; salt, 6 ozs., with 2 handfuls of the parings of horses' hoofs. The steel is to be heated to a cherry red. A large jug of this preparation should be kept corked tight, in order to retain its strength. Use soft water in all these tempering liquids.

Tempering Mill Picks.—Get double refined cast steel made expressly for mill picks. In drawing out the pick, use an anvil and hammer with smooth faces, and be careful not to heat the steel higher than a dark cherry red. Do not strike the pick on the edge when finishing it, but hammer it on the flat side, striking light and often, until the steel is quite dark, letting the blows fall so as to close the pores of the steel. When a dozen picks are ready to temper, get 2 gals. of rain water from which the chill should be taken, if in winter, by dipping a hot iron into it; add 2 lbs. salt, and it is ready for use. Heat your pick gradually from the centre; let the heat run to the point, and when it is a dark cherry red, dip the point vertically into the bath and hold it still. When the heat has left the part immersed, take it out, and cool the balance of the pick in ordinary water. Be sure to heat and hammer well.

To Temper a Drill very Hard.—Heat your drill to a cherry red and quench it in mercury. This will drill hardened steel.

Composition for Tempering.—Resin, 7½ parts; whale oil, 1½ parts; pulverized charcoal, ½ part; tallow, ½ part. *Directions.*—Very small tools should be dipped in this mixture, the same as in water, then polish and draw the temper as usual. Large tools should be dipped, then heated up again and temper as usual. This composition will also restore burnt steel as good as new. If small tools, dip once. If large, dip two or three times; no hammering is required.

Tempering Saws.—A late improvement consists in tempering and straightening the saws at one operation. This is done by heating the saws to the proper degree, and then pressing them with a sudden and powerful stroke between two surfaces of cold iron. A drop press is employed for the purpose. The mechanism is quite simple and inexpensive. Its use effects an important economy in the manufacture of nearly all kinds of saws, and also improves their quality.

Tempering Spiral Springs.—Place a piece of round iron inside the spring, large enough to fill it; then make the spring and iron red hot, and, when hot place them quickly into cold water, and stir them about till cold; afterwards rub them with oil or grease, and move them about in a flame till the grease takes fire; the spring will then be reduced to its proper temper.

Tempering Steel Springs.—The steel used should be that called "spring" for the large work; for small work, "double shear." After hardening in the usual way, in water, or, as some prefer, in oil, dry the spring over the fire to get rid of its moisture, then smear it over with tallow or oil, hold it over the flame of the smith's forge, passing it to and fro, so that the whole of it will be equally heated, holding it there until the oil or tallow takes fire. Take the article out of the fire and let it burn a short time, then blow it out. The process may be repeated two or three times if the operator fancies that any portion of the spring has not been reduced to the proper temperature, or rather raised to it.

To Temper Springs.—For tempering cast-steel trap springs, all that is

necessary is to heat them in the *dark*, just so that you can see that they are red; then cool them in luke-warm water. You can observe a much lower degree of heat in the dark than by daylight, and the low heat and warm water give the desired temper.

CASE-HARDENING COMPOUND.—Prussiate of potash, 2 lbs.; sal-ammoniac, 2 lbs.; bone dust, 2 lbs.

TEMPERING SWORDS AND CUTLASSES.—N. B. Ames, late of Chicopee, Mass., after many costly experiments, found that the best means of tempering swords and cutlasses that would stand the U. S. Government test, was by heating in a charcoal fire, hardening in pure spring water, and drawing the temper in charcoal flame.

TEMPERING TOOLS.—Drawing the temper of tools is usually done in a charcoal flame, and to draw the temper of a tool properly it should be held in the thickest part, or the part not requiring any temper, towards the fire and in the meantime, should be often wiped with a piece of waste or rag, dipped in oil. The oil keeps the temper even, and prevents it drawing more to one place than another. And in drawing the temper of any tool it should be drawn very slowly, otherwise it will run too far ere you are aware of it. Lancet blades and razors should be drawn to a straw color. Knife-blades and chisels should be drawn to a copper or almost red color. Plane-irons, shaving knives and shoemakers' knives the same temper; cold chisels and stone drills should be drawn to a dark blue. Fluted reamers should only be drawn to a straw color, on the end, as they never break elsewhere, and keep their size longer by leaving the lips hard. Half round or tapering reamers, also taps, dies, and drills, should be drawn to straw color. Jijncs and gauges, also common lathe tools, need no drawing, being tempered enough when merely hardened.

TO TEMPER TAPS OR REAMERS without springing, select your steel for the job, and forge the tap with a little more than the usual allowance, being careful not to heat too hot nor hammer too cold; after the tap or reamer is forged, heat it and hold it on one end of the anvil. If a large one, hit it with the sledge; if a small one, the hammer will do. This will cause the tap to bend slightly. Do not straighten it with the hammer, but on finishing and hardening the tap, it will become straight of its own accord.

TO HARDEN AND TEMPER CAST STEEL.—For saws and springs in general the following is an excellent liquid; Spermaceti oil, 20 gals.; beef suet *rendered*, 20 lbs.; neat's-foot oil, 1 gal.; pitch, 1 lb.; black resin, 3 lbs. The last two articles must be previously melted together, and then added to the other ingredients, when the whole must be heated in a proper iron vessel, with a close cover fitted to it, until all moisture is evaporated, and the composition will take fire on a flaming body being presented to its surface.

METALLIC BATH FOR TEMPERING.—Use a black lead or cast iron crucible (of the requisite depth), and place the same, filled with lead, on a fire made of coal or charcoal, and surrounded on all sides by a metallic or brick wall, level, or nearly so, with the top of the crucible; but at a sufficient distance (say 5 or 6 inches) from it, to receive the fuel necessary to maintain the fire, in order to keep the lead in a melted state. Let the crucible rest on iron bars, and leave apertures to admit air to the fire. The articles, slightly greased to prevent the adherence of oxide, are immersed in the melted lead (which is kept at a red heat) by means of tongs, two or three pairs being generally used, in order that one or two pieces may be heated while the other is undergoing manipulation by the hardening process. Keep the lead covered with charcoal dust or cinders. This plan is used by many cutlers and file manufacturers for giving the proper degree of heat in the tempering of their wares. The process is highly valued by those who use it. See file manufacture.

TO TEMPER SMALL SPRINGS.—*In Large Quantities.*—First, harden them in the usual manner of hardening steel; then place as many as convenient in a vessel containing oil. Heat the oil containing the springs until it takes fire from the top, and then set off the vessel and let it cool. The springs will then be found to possess the required temper.

TEMPERING.—The article after being completed, is hardened by being heated gradually to a bright red, and then plunged into cold water: it is then tempered by being warmed gradually and equably, either over a fire, or on a piece of heated metal, till of the color corresponding to the purpose for which it is required, as per table below, when it is again plunged into water.

	Corresponding Temperature.	
A very pale straw .	430	Lancets
Straw	450	Razors
Dark Straw . . .	470	Penknives } All kinds of wood tools.
Yellow	490	Scissors } Screw taps.
Brown yellow . . .	500	Hatchets, Chipping Chisels,
Slightly tinged purple	520	Saws.
Purple	530	All kinds of percussive tools.
Dark purple . . .	550	Springs.
Blue	570	
Dark blue	600	Soft for saws.

TEMPERING RAZORS, CUTLERY, SAWS, &C.—Razors and penknives are too frequently hardened without the removal of the scale arising from the forging: *this practice, which is never done with the best works, cannot be too much deprecated.* The blades are heated in a coke or charcoal fire, and dipped in the water obliquely. In tempering razors, they are laid on their backs upon a clean fire, about half-a-dozen together, and they are removed one at a time, when the edges, which are as yet thick, come down to a pale straw color. Should the backs accidentally get heated beyond the straw color, the blades are cooled in water, but not otherwise. Pen-blades are tempered a dozen or two at a time, on a plate of iron or copper, about 12 inches long, 3 or 4 inches wide, and about $\frac{1}{8}$ of an inch thick. The blades are arranged close together on their back and lean at an angle against each other. As they come down to a temper, they are picked out with small pliers and thrown into water if necessary; other blades are then thrust forward from the cooler parts of the plate to take their place. Axes, adzes, cold chisels, and other edge tools, in which the total bulk is considerable compared with the part to be hardened, are only partially dipped; they are afterwards let down by the heat of the remainder of the tool; and, when the color indicative of the temper is attained, they are entirely quenched. With the view of removing the loose scales, or the oxidation acquired in the fire, some workmen rub the objects hastily in dry salt before plunging them in water, in order to give them a cleaner and brighter face.

Oil, or resinous mixtures of oil, tallow, wax, and resin, are used for many thin and elastic articles, such as needles, fish hooks, steel pens and springs, which require a milder degree of hardness than is given by water. Gun lock-springs are sometimes *fried in oil* for a considerable time over a fire, in an iron tray; the thick parts are then sure to be sufficiently reduced, and the thin parts do not become the more softened from the continuance of the blazing heat. Saws and springs are generally hardened in various compositions of oil, suet, wax, &c. The saws are heated in long furnaces, and then immersed horizontally and edgeways into a long trough containing the composition. Part of the composition is wiped off the saws with a piece of leather, and when they are removed from the trough, and heated one by one, until the grease inflames. This is called "*blazing off.*" The composition used by a large saw manufacturer is 2 lbs. suet, and $\frac{1}{4}$ lb. of beeswax, to every gallon of whale oil, these are boiled together and will serve for thin works and most kinds of steel. The addition of black resin, about 1 lb. to each gallon, makes it serve for thicker pieces, and for those it refused to harden before; but resin should be added with judgment, or the works will become too hard and brittle.

TURNING AND BORING.—For *turning*, the proper speed for the circumference is about fifteen feet per minute. The best speed for boring cast-

iron is about 7½ feet per minute. For *drilling*, about 10 or 11 feet per minute is a good speed for the circumference of the tool. For a 1 inch drill, 40 revolutions = 11 feet per minute, other sizes in proportion.

Boring a Hole with a Boring Tool.—In boring a hole with a boring tool, it is usually necessary to drill the hole first, and too much care cannot be taken in finishing. An iron gauge should be made first; it is usually made of a piece of sheet iron or wire. The hole should then be drilled smaller than the size desired, and then bored to the required size, and it is impossible to bore a hole perfect without taking two or three light chips, mere scrapings with which to finish. Holes, in this way, may be bored as nicely as they can be reamed.

Boring Holes with Boring Arbor.—A boring arbor is a shaft with a set in it, for the purpose of boring holes of great length, and is designed to be used in a lathe. In doing this properly, you must first see if your lathe is set straight; if not, adjust it. Having done this, put the piece of work to be bored in the carriage of your lathe, pass your arbor through the hole to be bored, and put it on the centres of your lathe. Having done this, adjust your work true to the position desired by measuring from the point of the tool, continually turning round the arbor from side to side of the piece to be bored, while you are bolting it to the carriage, and measure until it is perfectly true. Having done this, bore the hole, and take for the last chip only a hundredth of an inch. This makes a true and smooth hole. It is impossible to make a hole true with any kind of a tool when you are cutting a large chip, for the tool springs so that no dependence can be placed upon it.

To Drill a Hole where you have no Reamer.—It is sometimes necessary to drill a hole of an exact size to fit a certain shaft, and at the same time have it smooth without reaming it. This may be done, by first drilling a hole one hundreth of an inch smaller than the size desired, and then making a drill the exact size and running it through to finish with. This last drill should have the corners of its lips rounded, like a reamer, and the hole should be finished without holding the drill with a rest.

To Make a Boring Arbor and tool that will not Chatter.—Boring tools, when used in small arbors, are always liable to chatter and make a rough hole. To prevent this, the tool should be turned in a lathe, while in its position in the arbor, upon the circle of the size of the hole to be bored, and the bearing lengthwise of the arbor, should be only as wide as the feed of the lathe; for if the bearing of a tool is on the face, the more it will chatter.

To Straighten Shafting.—This should be done by centreing, then put it into a lathe, and square the ends up with what is called a side tool. After doing this, take a piece of chalk and try it in several places, to find out where the worst crooks are: then, if you have not a machine for springing shafting, spring it with a lever where the most crook is, and continue this operation until the shaft is straight.

Turning Shafting.—To do this properly, two chips should always be run over the shaft, for the reason that it saves filing, and leaves the shaft truer and more round, and on shafts thus turned, the time saved in filing more than compensates for the time lost in turning. Before you commence you will put your feed belts or gear on a coarse feed: turn off one a sixty-fourth of an inch larger than the size required; having turned off this chip, commence the finishing chip, and turn it small enough to have the pulley wring on about an inch without filing. This will leave it large enough to file and finish. If there are couplings to go on a shaft, with holes smaller than the holes in the pulleys, the ends of the shaft, where they fit on, should be turned down to a sixty-fourth of an inch of the size required before any part of the shaft is finished; that is, every part of a shaft should be turned to within a sixty-fourth of a... inch of the size required before any part of it has the finish-chip taken off. The reason for that is that it leaves every part of the shaft perfectly true, which would not be the

case were it done otherwise. Having done this, you will file the shaft so that the pulleys will slide on, and the couplings so that they will drive on; polish the shaft with a pair of polishing-clamps and some emery and it is done.

To Forge a Twist Drill.—It is necessary to forge a flat blade similar to a flat drill, and then twist this blade into the resemblance required, then, with a light hammer, and careful blows, hammer the twisted edges so that they will be thicker than the central line of the tool. This will give greater strength and a better drill, and, to cut well, the central line or cutting point must be made quite thin. Be careful to get the *same twist* at the point of the drill as upon the body of the drill. The inexperienced often leave the point straight like a flat drill.

To Compute the Number of Teeth Required in a Train of Wheels to Produce a Given Velocity. *Rule.*—Multiply the number of teeth in the driver by its number of revolutions, and divide the product by the number of revolutions of each pinion, for each driver and pinion. *For speed of Wheel Pulleys, &c., see page* 267.

Example.—If a driver in a train of three wheels has 90 teeth, and makes 2 revolutions, and the velocities required are 2, 10 and 18, what are the number of teeth in each of the other two.

$$10 : 90 : : 2 : 18 = \textit{teeth in 2nd wheel.}$$
$$18 : 90 : : 2 : 10 = \textit{teeth in 3rd wheel.}$$

To Compute the Diameter of a Wheel. *Rule.*—Multiply the number of teeth by the pitch, and divide the product by 3. 1416.

Example.—The number of teeth in the wheel is 75, and the pitch 1,675 ins.: what is the diameter of it?

$$\frac{75 \times 1.6755}{3.1416} = 10 \textit{ ins.}$$

To Compute the True or Chordial Pitch. *Rule.*—Divide 180 by the number of teeth, ascertain the sine of the quotient, and multiply it by the diameter of the wheel.

Example.—The number of teeth is 75, and the diameter 40 inches; what is the true pitch?

$\frac{180}{75} = 2°24$, and *sine* of $2°24 = 04188$, which $\times\ 40 = 1.6752$ ins.

Paper Friction Pulleys.—These superior mechanical contrivances are made by cutting pieces of pasteboard into a circular form, and of the desired diameter of the pulley, and placing them in layers one on the top of another, cementing properly with a good coat of glue between each layer, pounding or pressing them together as close as possible, and leaving a perforation in the centre of each, for the shaft. When you have got enough of these layers together to give you the proper breadth of pulley, allow the glue to harden, then turn it off to a smooth finish in a lathe. Secure each side of the pulley with a good stout iron flange large enough to cover the entire diameter, or nearly so, and with proper usage it will last a long time.

On Belting and Friction.—Leather belts will last double the usual time if treated with castor oil, they will be rat proof, they will always remain flexible and will not crack. A belt 4 inches wide will be equal to one 6 inches wide without it. It requires about 24 hours to penetrate the leather, if used sooner the greasiness will cause it to slip. A leather belt should have a speed of 1300 ft. per minute, and not more than 1800 ft. or it will not last long. Leather belts, with grain side to pulley will drive 35 per. cent. more than the flesh side, because it is less porous, thus admitting less air between the surfaces. Pulleys covered with leather will evolve full 50 per cent. more power than the naked pulley. To in-

crease the power of rubber belting, use red lead, French yellow and litharge, equal parts; mix with boiled linseed oil and japan sufficient to make it dry quick. This will produce a highly polished surface. Experiments without lubricants resulted in showing the following co-efficients. Oak upon oak, 62; wrought iron on oak, 49 to 62; cast iron on oak, 65; wrought iron on cast, 19; cast iron on cast, 16; cast iron axles on lignumvitæ bearings, 18; copper on oak, 62; iron on elm, 25; pear tree on cast iron, 44; iron axles on lignumvitæ bearings (with oil), 11; iron axles with brass bearings (with oil), .07. A belt 5 in. wide, velocity 1000 ft. per minute, on leather covered pulleys, will yield 5-horse power; double the speed and it will evolve double the power.

Wheel Gearing.—The *Pitch Line* of a wheel, is the circle upon which the pitch is measured, and it is the circumference by which the diameter, or the velocity of the wheel is measured. The *Pitch*, is the arc of the circle of the pitch line, and is determined by the number of teeth in the wheel. The *True Pitch*, (*chordial*), or that by which the dimensions of the tooth of a wheel are alone determined is a straight line drawn from the centres of two contiguous teeth upon the pitch line. The *Line of Centres* is the line between the centres of two wheels. The *Radius* of a wheel is the semi-diameter running to the periphery of a tooth. The *Pitch Radius* is the semi-diameter running to the pitch line. The *Length of a tooth* is the distance from its base to its extremity. The *Breadth* of a tooth is the length of the face of wheel. A *Cog Wheel* is the general name for a wheel having a number of cogs set upon or radiating from its circumference. A *Mortise Wheel* is a wheel constructed for the reception of teeth or cogs which are fitted into recesses or sockets upon the face of the wheel. *Plate Wheels*, are wheels without arms. A *Rack* is a series of teeth set in a plane. A *Sector* is a wheel which reciprocates without forming a full revolution. A *Spur Wheel* is a wheel having its teeth perpendicular to its axis. A *Bevel Wheel* is a wheel having its teeth at an angle with its axis. A *Crown Wheel* is a wheel having its teeth at a right angle with its axis. A *Mitre Wheel* is a wheel having its teeth at an angle of 45° with its axis. A *Face Wheel* is a wheel having its teeth set upon one of its sides. An *Annular or Internal Wheel* is a wheel having its teeth convergent to its centre. *Spur Gear*, wheels which act on each other in the same plane. *Bevel Gear*, wheels which act upon each other at an angle. When the tooth of a wheel is made of a different material from that of the wheel, it is termed a *cog*, in a pinion it is termed a *leaf*, and in a trundle it is termed a *stave*. A wheel which impels another is termed the *spur*, *driver*, or *leader*; the one impelled is the *pinion*, *driver*, or *follower*. A series of wheels in connection with each other is termed a *train*. When two wheels act on each other, the greater is termed the *wheel* and the lesser the *pinion*. A *Trundle*, *Lantern*, or *Wallower*, is when the teeth of a pinion are constructed of round brass solid cylinders set in two discs. A *Trundle* with less than eight staves cannot be operated uniformly by a wheel with any number of teeth. The material of which cogs are made is about one fourth the strength of cast iron. *Buchanan* rules that to increase or diminish the velocity in a given proportion and with the least quantity of wheel-work, the number of teeth in each pinion should be to the number of teeth in its wheel as 1, 3. 5, 9. Even to save space and expense, the number should never exceed 1, 6. The least number of teeth that it is practicable to give to a wheel is regulated by the necessity of having at least one pair always in action, in order to provide for the contingency of a tooth breaking. The teeth of a wheel should be as small and numerous as is consistent with strength. When a *pinion is driven by a wheel*, the number of teeth in the pinion should not be less than eight. When *a wheel is driven by a pinion*, the number of teeth in the pinion should not be less than ten. The *number of teeth* in a wheel should always be prime to the number of the pinion, that is, the number of teeth in the wheel should not be divisible by the number of teeth in the pinion without a remainder; this is in order to prevent the

same teeth coming together so often as to cause an irregular wear of their faces. An odd tooth introduced into a wheel is termed a *hunting tooth* or *cog*

Galvanized Iron.—The zinc in galvanized iron exists in two states. The state which constitutes its value is that of an actual alloy with the iron, but besides there remains a considerable quantity of zinc which is merely adherent mechanically. A method has long been required for ascertaining with facility, and a certain degree of accuracy, the extent to which the zinc has combined with the iron, and if this combination is perfect throughout the plate. T. Bruce Warren has recently discovered a mode effecting this desideratum. When mercury is rubbed over a perfectly galvanized iron plate, it adheres nowhere; but if part of the zinc is merely mechanically attached, in that place the mercury forms an amalgam with it and attaches itself firmly. To estimate the exact amount of zinc combined with the iron, Mr. Warren detaches a sample from the particular set of plates or wires to be tested, cleanses it with dilute sulphuric acid, and then immerses it from four to eight hours in mercury. The difference between the weights before and after immersion will be the amount of uncombined zinc. The piece is then heated in a deoxidizing flame, and the weight once more taken; the amount lost will, in this case, represent the quantity of zinc which was actually alloyed with the iron.

To Form Perfect Squares.—You can test squares with the dividers by drawing two circles, one within the other, from the same centre, of 16 and 12 inches diameter respectively; then set the dividers to 10 inches, insert one point in any part of the outer circle, and mark the point exactly where a circle (drawn with the dividers in this position), would intersect the inner circle; now draw a straight line through the centre of the circles and through the point marked in the inner circle; and through the outer one, another line starting from the point where the dividers were inserted in the outer circle through the centre of the circles until the outer circle is reached. If this is done exactly, the points where those lines intersect the outer circle will form the corners of a perfect square whose side is 11.3137 inches. If the square is correct, it will fit the square thus formed, and also the lines in the centre, which divide the circle into 4 equal parts, and the angles must be 90°. This is based on the rule for finding the hypothenuse of a right-angled triangle, thus: 6 square = 36 and 8 square = 64, sum 100, the square root of which is 10. This is sometimes called the 6, 8, and 10 rule for squaring buildings.

Bells.—The London "Hour," in an article on campanology, or the art of ringing, says: The first origin of bells is unknown. They were used by the Hebrews, and are mentioned by Plutarch and other ancient writers. Those of the size ordinarily used in churches are said to have been invented by Paulinus, who, about A. D. 400, was Bishop of Nola in Campana—hence the terms campanology, campanile, &c. To Turketul, Abbot of Croyland, in Lincolnshire, may, we believe, be ascribed the credit of having introduced the first church bell used in England. The tone emitted by a bell depends conjointly on the diameter, height, and thickness; and the casting of a bell is a work requiring great nicety in the performance. The metal used in making the great bell in York Minster—about twelve tons—took twelve days to cool. The one in the cathedral at Montreal, cast by Messrs. Spears, of Whitechapel, weighs thirteen and a half tons; and "Big Ben," of Westminster, made by Messrs. Warner, of Stockton, weighs twenty-five tons, while the one at Moscow, which fell in 1737, weighed, according to Mr. Denison's estimate, no less than 200 tons.

Wood, to Protect from the Influences of Air or Water.—A composition for the preservation of wood under these circumstances is composed as follows:—Take ten parts of sulphuret of copper, two parts of sulphuret of antimony, and from five to thirty parts of the best drying varnish. These substances must be ground together, forming a kind of paint, which is then to be applied to the wood. Another means of protecting wood, peculiarly liable to the influences of damp, is, to heat twelve pounds

of resin in a mortar, with three pounds of sulphur and twelve pints of sperm oil. This mixture is to be melted over the fire, continually stirring meanwhile. Ochre, reduced to a very fine powder, by grinding it down with oil, must then be combined in the proportion necessary to impart either a darker or a lighter color to the material. The first coat must be put on very lightly, having been previously heated; the second coat may be laid on two or three days afterwards; and a third after a similar interval.

WOOD, TO REMOVE STAINS FROM.—Stains of nearly every description may be removed from wood by the following method:—Mix a quarter of an ounce of oil of vitriol with two ounces of water, and rub the stained surface with a cork dipped in this liquid until the stains disappear; then wash the part with cold water. The color of the wood will fade for some time after this application; but it may be restored by rubbing it with ordinary furniture paste.

WOOD, TO STAIN.—Any ordinary kind of wood may be stained of certain colors, or made to imitate other woods, by the following process:—*To stain wood of a black color.* 1. Drop a little sulphuric acid into a small quantity of water, brush the wood over with this and hold it to the fire, a fine black color will be produced, and it will receive a good polish. 2. Take half a gallon of vinegar, an ounce of bruised nutgalls, half a pound each of logwood chips and copperas, boil well, add half an ounce of the tincture of sesquichloride of iron, and brush it on the wood in a warm state. 3. Take half a gallon of vinegar, half a pound of dry lamp-black, and three pounds of iron-rust sifted. Mix, and let it stand for a week. Lay three coats of this on hot, and then rub with linseed oil, and a fine deep black will be produced. 4. Add to the above stain an ounce of nutgalls, half a pound logwood chips, and a quarter of a pound of copperas; lay on three coats, oil well, and a black stain will result impervious to any kind of weather. 5. Take a pound of logwood chips, a quarter of a pound of Brazil wood, and boil for an hour and a half in a gallon of water. Brush the wood several times with this decoction while hot. Make a decoction of nutgalls by simmering gently for three or four days a quarter of a pound of the galls in two quarts of water. Brush the wood several times with this decoction while hot; give the wood three coats of this, and while wet lay on a solution of sulphate of iron, and when dry, oil or varnish. 6. Give three coats with a solution of copper filings in aquafortis, and repeatedly brush over the logwood decoction, until the greenness of the copper is destroyed. 7. Boil half a pound of logwood chips in two quarts of water, add an ounce of pearlash, and apply it hot with a brush. Then take two quarts of the logwood decoction, half an ounce of verdigris, and the same of copperas; strain, and throw in half a pound of iron-rust. Brush the work well with this, and oil it. *Blue Color.* 1. Dissolve copper filings in aqua-fortis, brush the wood with it, and then go over the work with a hot solution of pearlash (two ounces to a pint of water), till it assumes a perfectly blue color. 2. Boil a pound of indigo, two pounds of wood, and three ounces of alum in a gallon of water; brush well over until thoroughly stained. *Imitation of Botany Bay wood.* Boil half a pound of the unripe berries of the *rhamnus infectorius*, in two quarts of water, till of a deep yellow, and while boiling hot, give two or three coats to the work. If a deeper color be desired, give a coat of logwood decoction over the yellow. When nearly dry, form the grain with *No.* 7 *Black stain*, used hot, and when perfectly dry varnish. *Green Color.* Dissolve verdigris in vinegar, and brush over with the hot solution until of a proper color. *Mahogany color.* 1. Boil half a pound of madder, and two ounces of logwood chips in a gallon of water, and brush well over while hot. When dry, go over the whole with pearlash solution, two drachms to the quart. 2. Put two ounces of dragon's blood, bruised, into a quart of oil of turpentine; let the bottle stand in a warm place, shake frequently, and when dissolved, steep the work in the mixture. *Light red brown.* Boil half a pound of madder, and a quarter of a pound of fustic in a gallon of water; brush the work when boiling hot, until properly stained.

2. The surface of the work being quite smooth, brush over with a weak solution of aqua-fortis; half an ounce to the pint, and then finish with the following :—put four ounces and a half of dragon's blood, and an ounce of soda, both well bruised, to three pints of spirits of wine; let it stand in a warm place, shake it frequently, strain, and lay on with a soft brush, repeating until of a proper color; polish with linseed oil or varnish. *Purple.* Brush the work several times with the logwood decoction used for *No.* 6 *black*, and when dry give a coat of pearlash solution, one drachm to the quart, taking care to lay it on evenly. *Red.* 1. Boil a pound of Brazil wood, and an ounce of pearlash in a gallon of water, and while hot, brush over the work until of a proper color. Dissolve two ounces of alum in a quart of water, and brush the solution over the work before it dries. 2. Take a gallon of the above stain, add two more ounces of pearlash, hot, and brush often with the alum solution. 3. Use a cold infusion of archil, and brush over with the pearlash solution used for *No.* 8. *mahogany color. Imitation of rosewood.* 1. Boil half a pound of logwood in three pints of water till it is of a very dark red, add half an ounce of salt of tartar; stain the work with the liquor while boiling hot, giving three coats; then with a painter's graining brush, form streaks with *No.* 9 *black stain;* let it dry, and varnish. 2. Brush over with the logwood decoction used for *No.* 6 *black*, three or four times; put half a pound of iron filings into two quarts of vinegar; then with a graining brush or cane, bruised at the end, apply the iron-filing solution in the form required, and polish with beeswax and turpentine when dry. *Yellow color.* 1. Brush over with the tincture of turmeric. 2. Warm the work, and brush over with weak aqua-fortis, then hold to the fire. Varnish or oil as usual.

Action of Water on Lead.—Water as supplied for domestic use may suffer contamination from various sources; from the metallic pipes through which it flows, and the vessels in which it is stored. It is well known that water exerts a certain solvent action on lead, and that this action varies in accordance with the quality and quantity of the salts held in solution by the water. It may be safely stated that when a perfectly pure water is used, such as might be obtained by distillation, the action of this fluid on lead would be to dissolve a notable quantity of the metal. But as in nature, perfectly pure water, free from any of the salts of lime or soda is almost unknown, the danger of lead poisoning from the solution of the material in the pipes is insignificant. Still, researches as to the actual effects of the salts when in water on lead are very interesting. The nitrates alone, even in small quantity, cause water to exert a very marked solvent action upon lead. The presence of other salts, as the sulphates, carbonates, and chlorides, along with the nitrates, greatly decreases, or even stops, this solvent action, carbonates more especially exercising a deterrent action. The carbonates, sulphates and chlorides, when added to distilled water, greatly diminish the solvent action of the water on the lead. Therefore it may be safely stated that in natural waters, even if contaminated with nitrates, when they contain small quantities of soluble carbonates, sulphates or chlorides, the solvent action of these waters upon lead pipes is comparatively small. Dr. Muir, in a series of interesting experiments on this subject, states that in water containing 1.4 grains of nitrate of ammonium, and 42 grains of calcium chloride per gallon, the amount of lead dissolved after seventy-two hours was only 0.126 grains per gallon, whereas water containing the same amount of ammonium nitrates, but without the addition of any other salt, dissolved 1.75 grains per gallon, or about fifteen times as much lead in the same time.

To Remove Rust from Steel.—Cover the steel with sweet oil, well rubbed on. In forty-eight hours rub with finely pulverized unslaked lime until the rust disappears.

To Preserve Metals from Rust.—Take some melted beeswax and rub it over the article to be preserved. When dry, warm the article again, so as to get off the wax, and rub it with a cloth until the former polish is

restored. By this means all the pores of the metal are filled up without injury to the appearance, and rust will not attack it, unless very carelessly exposed to constant humidity.

To Remove or Keep Rust from Cutlery.—Bristol brick is good te remove rust, and give a polish to steel utensils. It should be powdered fine, and rubbed on dry, with a woollen cloth. Knives should be rubbed on a board, with a thick leather covered over it, and fastened down tight. The brick should be dry, and powdered fine, and the knives should not be wet after cleaning, but merely wiped, with a dry clean cloth. To make the handles smooth, wipe them with a cloth that is a little damp, being careful not to touch the blades, as it will tarnish them. Knives look very nice cleaned in this manner, and the edges will keep sharp. Ivory-handled knives should never have the handles put in hot water, as it will turn them yellow. If, through misuse, they turn yellow, rub them with sand paper. When Bristol brick will not remove rust from steel, rub the spots with sand paper or emery, or else rub on sweet oil, and let it remain a day; then rub it off with powdered quicklime. To keep steel utensils (that are not in constant use) from contracting rust, clean them thoroughly with Bristol brick, wipe them on a perfectly dry cloth, and rub them over with sweet oil, and cover them with brown paper, so as to exclude the air. Knives and forks should be wrapped up in brown paper, each one by itself.

To Prevent Iron or Steel from Rusting.—Warm your iron or steel till you cannot bear your hands on it without burning yourself, then rub it with new and clean white wax. Put it again to the fire till it has soaked in the wax. When done rub it over with a piece of serge. This prevents the metal from rusting afterwards.

Steel Prevention of Rust.—Dissolve half an ounce of camphor in a pound of hog's lard; take off the scum; mix as much black-lead as will give the mixture an iron color. Iron and steel goods rubbed over with this mixture, and left with it on twenty-four hours, and then dried with a linen cloth, will keep clean for months. Valuable articles of cutlery should be wrapped in zinc-foil, or be kept in boxes lined with zinc. This is at once an easy and most efficient method.

One pound of Anthracite coal in a cupola furnace will melt from 5 to 10 lbs. of cast iron: 8 bushels of bituminous coal will melt 1 ton of cast iron. Small coal produces about $\frac{3}{4}$ of the effect of large coal of the same kind.

Springs.—The flexure of a spring is proportional to its load and to the cube of its length. A railway carriage spring, consists of 10 plates 5-16 inch thick and 2 of 3-8 inch, length 2 feet 8 ins., width 3 ins., and *camber* or spring 6 ins.; deflected as follows, without any permanent set, $\frac{1}{4}$ ton, $\frac{1}{2}$ inch; 1 ton, 1 inch; $1\frac{1}{2}$ tons, $1\frac{1}{2}$ inches; 2 tons, 2 inches; 3 tons, 3 inches; 4 tons, 4 inches.

Shrinkage of Castings.

Iron, small cylind's	=1-16th in. per ft.	Ditto, in length.	$\frac{1}{8}$ in 16 ins.
" Pipes. . . .	$= \frac{1}{8}$ " " "	Brass, thin. . . .	$= \frac{1}{8}$ in 9 "
" Girders, beams, etc.	$= \frac{1}{8}$ in. in 15 ins.	Brass, thick. . .	$= \frac{1}{8}$ in 10 "
" large cylinders, the contraction of diameter at top	= 1-16th per foot.	Zinc.	= 5-16ths in a foot
Ditto at bottom	= 1-12th per foot.	Lead.	= 5-16ths " "
		Copper.	= 3-16ths " "
		Bismuth. . . .	= 5-32nds " "

Green sand iron castings are 6 per cent. stronger than dry, and 30 per cent. stronger than chilled, but when the castings are chilled and annealed, a gain of 115 per cent. is attained over those made in green sand. Chilling the under side of cast iron very materially increases its strength.

EFFECTS OF HEAT ON VARIOUS BODIES.

Fine Gold melts.	2590°	Heat, cherry red.	1500°
" Silver "	1250	" bright "	1860
Copper melts.	2548	" red visible by day.	1077
Wrought Iron melts.	3980	" white.	2900
Cast " "	3479	Mercury boils.	662
Bright red " in the dark.	752	" volatilizes.	680
Red hot " in twilight.	884	Platinum melts.	3080
Glass melts.	2377	Zinc melts.	740
Common fire.	790	Highest natural temperature (Egypt).	117
Brass melts.	1900	Greatest natural cold (below zero).	56
Air furnace.	3300	" artificial " "	106
Antimony melts.	951	Heat of human blood.	98
Bismuth "	476	Snow and Salt, equal parts.	0
Cadmium.	600	Ice melts.	32
Steel.	2500	Water in *vacuo* boils.	98
Lead.	504	Furnace under steam boiler.	1100
Tin.	421		

WATER-PIPES, TO PREVENT FREEZING.—The tying up of the ball-tap with straw or flannel during severe weather, will, in general, prevent the freezing of water-pipes. But the surest method is to have the main-pipe higher than the cistern or other receptacle; and, being thus of a regular incline, the pipe will immediately be exhausted when the supply ceases. When water remains in the pipes, if each tap be left dripping, the circulation of the water will prevent it from freezing in the pipes.

REFINING FLUXES, FOR METALS.—Deflagrate, and afterwards pulverize, 2 parts of nitre and 1 part of tartar. The following fluxes answer very well, provided the ores be deprived of their sulphur, or if they contain much earthy matter, because, in the latter case, they unite with them, and convert them into a thin glass, but, if any quantity of sulphur remains, their fluxes unite with it, and form a liver of sulphur, which has the power of destroying a portion of all the metals, consequently the assay must be, under such circumstances, very inaccurate. Limestone, feldspar, fluorspar, quartz, sand-slate, and slags, are all used as fluxes. Iron ores, on account of the argillaceous earth they contain, require calcareous additions; and the copper ores, rather slags, or nitrescent stones, than calcareous earth.

FLUX FOR WELDING COPPER.—Boracic acid, 2 parts; phosphate of soda, 1 part; mix. This welding powder should be strewn over the surface of copper at a red heat; the pieces should then be heated up to a full cherry red, or yellow heat and brought immediately under the hammer. Heat the copper at a flame, or gas jet, where it will not touch charcoal or solid carbon.

CORNISH REDUCING FLUX.—Tartar, 10 ozs., nitre, 3 ozs. and 6 drs.; borax, 3 oz. and 1 dr. Mix together.

PASTE FOR CLEANING METALS.—Take oxalic acid, 1 part; rotten stone, 6 parts; mixed with equal parts of train oil and spts. turpentine to a thick paste.

ZINCING.—Copper and brass vessels may be covered with a firmly adherent layer of pure zinc by boiling them in contact with a solution of chloride of zinc, pure zinc turnings being at the same time present in considerable excess.

TO CLOUD METAL WORK.—Metal work may be clouded by putting a piece of fine emery paper under the thumb or finger and working it over the surface of the metal with a spiral motion.

TINNING ACID FOR BRASS OR ZINC.—Muriatic acid, 1 qt.; zinc, 6 ozs. To a solution of this, add water, 1 qt.; sal-ammoniac, 2 ozs.

TINNING CAST IRON.—Pickle your castings in oil of vitriol; then cover

or immerse them in muriate of zinc (made by putting a sufficient quantity of zinc in some spirit of salt): after which dip it in a melted bath of tin or solder.

Bronze Paint for Iron or Brass.—Chrome green, 2 lbs.; ivory black, 1 oz.; chrome yellow, 1 oz,; good japan, 1 gill; grind all together, and mix with linseed oil.

To Bronze Iron Castings.—Cleanse thoroughly, and afterwards immerse in a solution of sulphate of copper, when the castings will acquire a coat of the latter metal. They must be then washed in water.

Removing Zinc and Iron From Plumbers' Solder.—Digest the metal in grains in diluted sulphuric acid. The acid will dissolve the zinc first, the iron next, and all traces of these metals by subsequent washing.

Solution of Copper or Zinc.—Dissolve 8 ozs. (Troy) cyanide of potassium, and 3 ozs. cyanide of copper or zinc, in 1 gal. of rain water. To be used at about 160° F., with a compound battery of 3 to 12 cells.

Bronze, to Remove Stains from.—Make the article very hot by dipping it in boiling water, then rub it with a piece of flannel moistened with suds made from yellow soap; rub clean with soft linen cloths. If the article to be cleaned be a tea urn or other similar vessel, it should be filled with boiling water before the outside is touched.

To Reduce Oxide of Zinc.—The oxide may be put in quantities of 500 or 600 lbs. weight into a large pot over the fire; pour a sufficient quantity of muriatic acid over the top, to act as a flux, and the action of the fire will melt the dross, when the pure metal will be found at the bottom of the pot.

Bronzing Liquids for Tin Castings.—Wash them over, after being well cleansed and wiped, with a solution of 1 part of sulphate of iron, and 1 part of sulphate of copper, in 20 parts of water; afterwards, with a solution of 4 parts verdigris in 11 of distilled vinegar; leave for an hour to dry and then polish with a soft brush and colcothar.

To Tin Copper and Brass.—Boil 6 lbs cream of tartar and 4 gals. of water and 8 lbs. of grain tin or tin shavings. After the material has boiled a sufficient time, the articles to be tinned are put therein and the boiling continued, when the tin is precipitated on the goods in metallic form.

To Separate Tin from Lead.—If the lead and tin are in solution, precipitate the former by sulphuric acid, and the latter with sulphuretted hydrogen gas. In an alloy the lead will dissolve in nitric acid, leaving the tin as an oxide.

To Clean and Polish Brass.—Oil of vitriol, 1 oz.; sweet oil, ½ gill; pulverized rotten stone, 1 gill; rain water, 1½ pts.; mix all and shake as used. Apply with a rag and polish with buckskin or all woollen. Rotten stone, followed by Paris white and rouge is very good also.

To Clean and Polish Brass.—Wash with alum boiled in strong lye, in the proportion of an ounce to a pint; afterwards rub with strong tripoli. Not to be used on gilt or lacquered work.

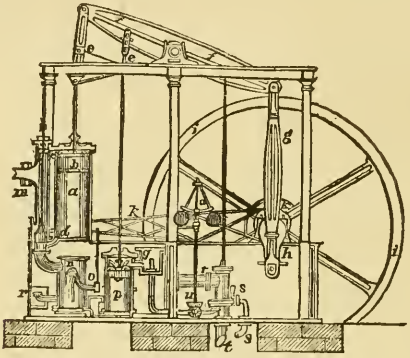
Brass Solution.—Dissolve 1 lb. (Troy) cyanide of potassium, 2 ozs. cyanide of copper, and 1 oz. cyanide of zinc, in 1 gal. of rain water; then add 2 ozs. of muriate of ammonia. To be used at 160° F., for smooth work, with a compound battery of from 3 to 12 cells.

Brassing Iron.—Iron ornaments are covered with copper or brass, by properly preparing the surface so as to remove all organic matter which would prevent adhesion, and then plunging them into melted brass. A thin coating is thus spread over the iron, and it admits of being polished or burnished.

To Refine Copper.—This process differs from the one employed to refine silver in no respects save the plate to be immersed; you use an iron instead of a copper plate to collect the metal.

If the impurities of gold refined were both silver and copper, you might, after saving the silver as above directed, sink your iron plate into the solution yet remaining, and take out the copper. The parts of alloyed gold may be separated by these processes, and leave each in a perfectly pure state.

The Steam-Engine.—Every mechanic and inventor should make himself generally familiar with the construction and operation of the steam-engine. To assist them in gaining this knowledge, we subjoin for reference



a diagram of the common Condensing Engine, with letters of reference to the names of the various parts:

a, steam cylinder; *b*, piston; *c*, upper steam port or passage; *d*, lower steam port; *e e*, parallel motion; *f f*, beam; *g*, connecting rod; *h*, crank; *i i*, fly-wheel; *k k*, eccentric and its rod for working the steam-valve; *l*, steam-valve and casin; *m*, throttle-valve; *n*, condenser; *o*, injection-cock; *p*, air-pump; *q*, hot well; *r*, shifting-valve to create vacuum in condenser previous to starting the engine; *s*, feed-pump to supply boilers; *t*, cold-water pump to supply condenser; *u*, governor. A study of the above diagram and description, in connection with attentive observation of engines in motion, will be of much assistance in acquiring a general understanding of the machine. We recommend the following standard works for careful study by all who desire to become thoroughly posted: Bourne's Catechism of the Steam engine, Main & Brown's Marine Steam-Engine.

Iron Lustre is obtained by dissolving a piece of zinc with muriatic acid, and mixing the solution with spirit of tar, and applying it to the surface of the iron.

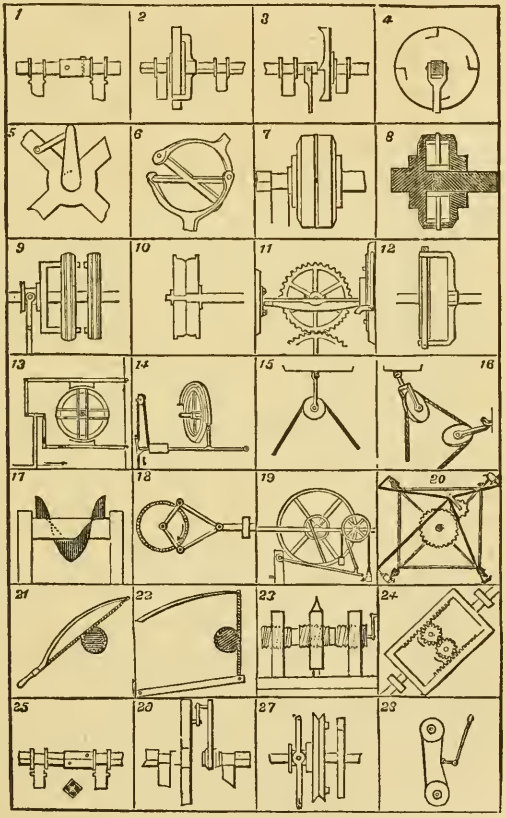
Fancy Colors on Metals.—1. Dissolve 4 ozs. hypo-sulphite of soda, in 1½ pts. of water, and then add a solution of 1 oz. acetate of lead in 1 oz. water. Articles to be colored are placed in the mixture, which is then gradually heated to the boiling point. This will give iron the color of blue steel, zinc becomes bronze, and copper or brass becomes, successively, yellowish, red, scarlet, deep blue, light blue, blueish white, and finally white, with a tinge of rose. 2. By replacing the acetate of lead in the solution by sulphate of copper, brass becomes, first, of a fine rosy tint, then green, and lastly, of an iridescent brown color.

To Cast Brass Solid.—The metal should not be run any hotter than is necessary to insure sharp castings. The most probable cause of the honey-combings of castings is that the air cannot get out of the way; and there ought to be proper vents made for it from the highest parts of the mould; the metal should be run in near or at the bottom of the mould. If about 1 lb. of lead be added to every 16 lbs. of old brass, when just at the melting point, solid good brasses will be the result. In melting old brass, the zinc, or lead, contained in it (when fluid) oxydizes freely, consequently the proportions of the metals are altered, and require an addition similar to the above. If the brass has not been re-cast a little less lead will do but if re-cast several times it may take the full quantity.

140 VALUABLE MECHANICAL MOVEMENTS

FOR INVENTORS, MODEL MAKERS, &C.

MECHANICAL MOVEMENTS.—In the construction of models, or machinery, the skilful mechanic and inventor will study to avoid clumsiness in the arrangement of parts, and will naturally take pride in selecting, as far as possible, the simplest and best forms of mechanical movements.



To this end, we have thought that nothing could be more suggestive or useful than a comprehensive exhibition of many of the best mechanical forms already known.

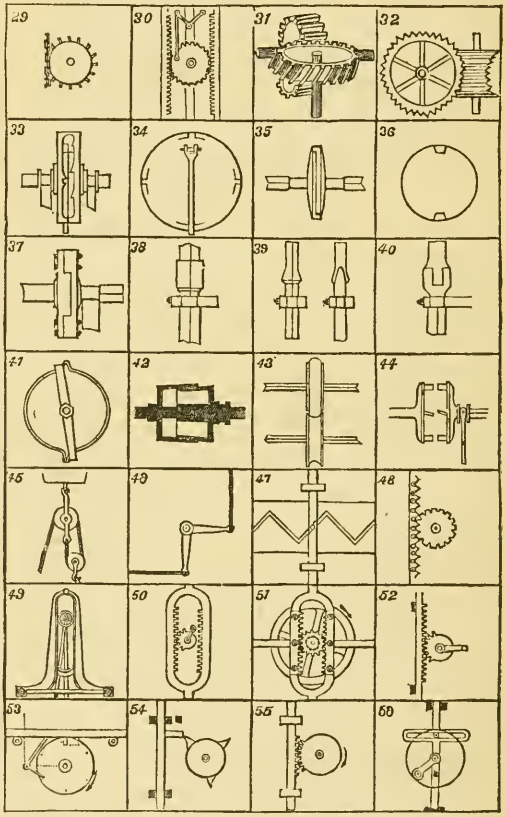
After much labor and expense, we have brought together, condensed and engraved expressly for this work, one of the most extensive series of mechanical movements ever published.

Here the mechanic may find at a glance the movement suited for his

purpose, and may see the separate parts best adapted to any special combination of mechanism.

As these engravings are not readily to be found elsewhere, we recommend the careful preservation of this book.

Description of the Mechanical Movements by Numbers.—1 Shaft coupling. 2. Claw coupling. 3, 4. Lever couplings. On the driving shaft, a disc with spurs is mounted, and to the shaft to be driven a lever is hinged. By causing this lever to catch in the spurs of the disc, the coupling is effected. 5. Knee or rose coupling, of which 26 is a side view. 6. Universal joint. 7, 8. Disc and spur coupling. 9. Prong and spur lever coupling.



10. Fast and loose pulley. 11. Sliding gear, the journal boxes of one of the wheels being moveable. 12. Friction clutch. By tightening or releasing a steel band, encircling a pulley on the shaft, the machinery is thrown in or out of gear. 13, 14. Shoe and lever brakes. 15, 16. Change of motion by sheaves. 17. Spiral flanged shaft. 18. Connected with the rod are pawl links, catching into ratchet-teeth in the wheel to which rotary motion

is to be imparted. When the rod moves in one direction, one of the pawls acts; and when the rod moves in the opposite direction, the other pawl acts in the same direction as the first. 19. The reciprocating motion of a rod is converted into rotary motion of the fly-wheel by a weight suspended from a cord, which passes over a small pulley that connects with a treadle, from which the motion is transmitted to the fly-wheel.

20. "Flying horse," used in fairs for amusement. By pulling the cords radiating from the crank, the persons occupying the seats or horses on the ends of the arms are enabled to keep the apparatus in motion. 21, 22. Bow-string arrangements, to connect reciprocating into rotary motion. 23. Seam purpose by differential screw. 24. The same by double rack and wheels 25. Coupling for square shafts. 26. Side view of Fig. 5. 27. Sliding spur pulley coupling. 28. Lever with bearing roller to tighten pulley bands. 29. Chain wheel.

30. Reciprocating rectilinear into reciprocating rotary motion by two racks and cog wheel. 31. Oblique toothed wheels. 33. Worm and worm wheel. 33, 34. Claw coupling with hinged lever. 35, 36. Disc couplings. with lugs and cavities. 37. Disc couplings with screw bolts. 38, 39, 40. Shaft couplings.

41. Face view of Fig. 12. 42. Friction cones. 43. Friction pulleys. 44. Self-releasing coupling. Discs with oblique teeth. If the resistance to the driver shaft increases beyond a certain point, the discs separate. 45. Hoisting blocks. 46. Elbow crank, for changing motion. 47. Reciprocating into rotary motion by zig-zag groove on cylinder. 48. Another form of Fig. 29. 49. Reciprocating into a rotary motion.

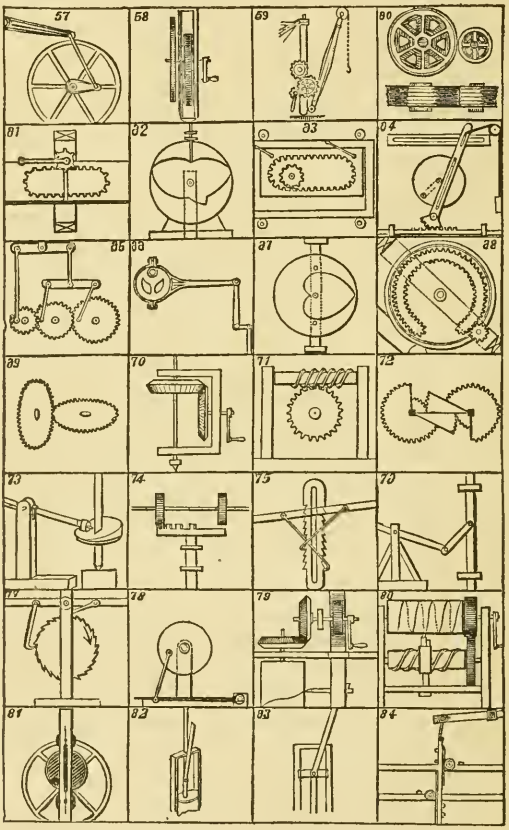
50. Same purpose. 51. Same purpose, by double rack and two ratchet pinions. When the double rack moves in one direction, one pinion is rigid with the shaft; when the rack moves in the opposite direction, the other pinion is rigid, and a continuous rotary motion is imparted to the fly-wheel shaft. 52. Reciprocating into oscillating, 53. Rotary into reciprocating. By the action of the wheel pins, the carriage is moved in one direction, and by the action of said pins on an elbow-lever, it is moved in the opposite direction. 54. Stamp rod and lifting cam. 55. For giving reciprocating motion to rack. 56. Same motion to a bar with slot, by means of an eccentric pin projecting from a revolving disc, and catching in the slot. 57. Walking beam and fly-wheel. 58. Reciprocating motion to pump or other rod by means of eccentric disc and friction rollers. See 81 and 104. 59. Hoisting crane.

60. Friction gears. See 43. 61. Rotary in reciprocating by rising and falling pinion acting on endless rack. 62. By the revolving cam, a rising and falling or a reciprocating rectilinear motion is imparted to a drum. 63. Reciprocating motion to a frame by means of endless rack and pinion. 64. Reciprocating rectilinear motion to a toothed rack by a toothed segment on a lever-arm, which is subjected to the action of a weight, and of an eccentric wrist-pin, projecting from a revolving disc. 65. Reciprocating motion to a rod. The wheels are of different diameters, and consequently the rod has to rise and fall as the wheel revolves. (See 110.) 66. Cam and elbow lever. 67. Rod reciprocates by means of cam. 68. Revolving into reciprocating motion, by an endless segmental rack and pinion, the axle of which revolves and slides in a slot toward and from the rack. This rack is secured to a disc, and a rope round said disc extends to the body to which a reciprocating motion is to be imparted. 69. Elliptic gears.

70. Bevel gear. 71. Worm and worm wheel. 72. Transmitting motion from one axle to another, with three different velocities, by means of toothed segments of unequal diameters. 73. Continuous revolving into reciprocating, by a cam-disc acting on an oscillating lever. 74. Intermittent revolving motion to a shaft with two pinions, and segment gear wheel on end of shaft. 75. Oscillating lever, carrying pawls which engage teeth in the edges of a bar to which rectilinear motion is imparted. 76. Oscillating lever, connects by a link with a rod to which a rectilinear motion is im-

parted. 77. Oscillating lever and pawls, which gear in the ratchet-wheel 78. Common treadle. 79. Describing on a revolving cylinder a spiral line of a certain given pitch, which depends upon the comparative sizes of the pinion and bevel-wheels.

80. Marking a spiral line, the graver moved by a screw. 81. (See Fig. 53). 82. Plunger and rods. 83. Cross head and rods. 84. Reciprocating rod guided by friction rollers. 85. Revolvers into reciprocating motion, by means of roller-arms, extending from a revolving shaft, and acting on lugs projecting from a reciprocating frame. 86. Crank motion. 87. Recipro-

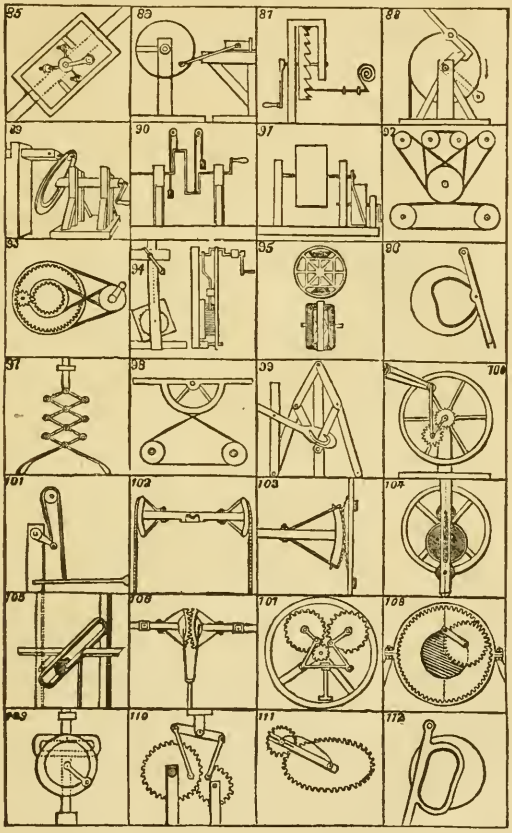


cating motion by toothed wheel and spring bar. 88. The shaft carries a tappet, which catches against a hook hinged to the drum, so as to carry said drum along and raise the weight on the rope. When the tappet has reached its highest position, the hook strikes a pin, the hook disengages from the tappet, and the weight drops. 89. Reciprocating motion to a rod by means of a groove in an oblique ring secured to a revolving shaft.

90. Double crank. 91. Cam groove in a drum, to produce reciprocating motion. 92. Belts and pulleys. 93. Pulleys, belts, and internal gear. 94.

As the rod moves up and down, the teeth of the cog-wheel come in contact with a pawl, and an intermittent rotary motion is imparted to said wheel. 95. By turning the horizontal axles with different velocities, the middle wheel is caused to revolve with the mean velocity. 96. Oscillating lever and cam groove in a disk. 97. Lazy tongs. 98. Oscillating segment and belt over pulleys. 99. Converting oscillating into a reciprocating motion by a cam-slot in the end of the oscillating lever which catches over a pin projecting from one of the sides of a parallelogram which is connected to the rod to which reciprocating motion is imparted.

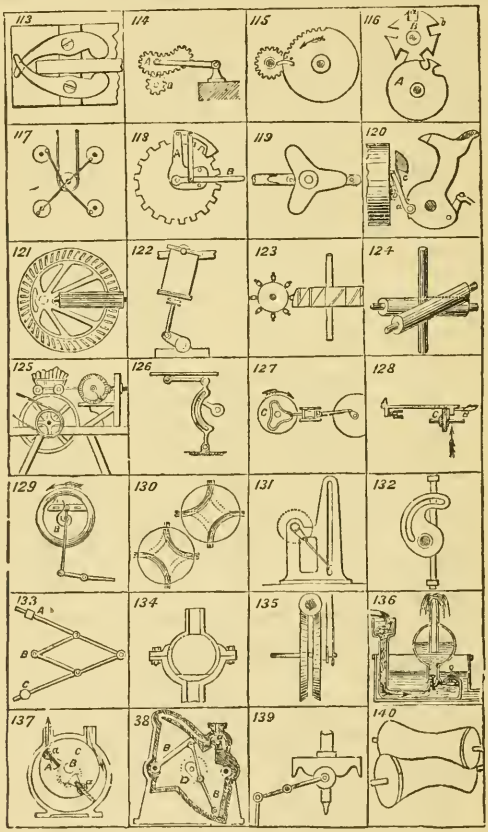
100. Oscillating motion of a beam into rotary motion. 101. Motion of a



treadle into rotary motion. 102. Double-acting beam. 103. Single-acting beam. 104. (See Figures 58 and 81.) 105. Device to steady a piston by a slotted guide-piece, operated by an eccentric on the driving-shaft. 106. Rod operated by two toothed segments. 107. Two cog-wheels of equal diameter, provided with a crank of the same length, and connected by links with a cross-bar to which the piston-rod is secured. 108. Device for a rectilinear motion of a piston-rod based on the hypocycloidal motion of a

pinion in a stationary wheel with internal gear. If the diameter of the pinion is exactly equal to one-half the diameter of the internal gear, the hypocycloid becomes a right line. 109. Same purpose as 56.

110. Action similar to 65. 111. Revolving motion by a circular sliding pinion gearing in an elliptical cog-wheel. 112. Similar to 96. 113. Carpenter's clamp. The jaws turn on their pivot-screws, and clamp the board. 114. An irregular vibratory motion is given to the arm carrying the wheel A, by the rotation of the pinion B. 115. Intermittent rotary motion of the pinion-shaft, by the continuous rotary motion of the large wheel. The



part of the pinion shown next the wheel is cut on the same curve as the plain portion of the circumference, and, therefore, serves as a lock whilst the wheel makes a part of a revolution, and until the pin upon the wheel strikes the guide-piece upon the pinion, when the pinion-shaft commences another revolution. 116. Stop-motion used in watches to limit the number of revolutions in winding up, the convex curved part, a, b, of the wheel B, serving as the stop. 117. Several wheels, by connecting rods, driven from one pulley. 118. Intermittent circular motion is imparted to the toothed

wheel by vibrating the arm B. When the arm, B, is lifted, the pawl is raised from between the teeth of the wheel, and travelling backward over the circumference again, drops between two teeth on lowering the arm, and draws with it the wheel. 119. Reciprocating rectilinear motion is given to the bar by the continuous motion of the cam. The cam is of equal diameter in every direction measured across its centre.

120. Mechanism for revolving the cylinder in Colt's firearms. When the hammer is drawn back, the dog, a, attached to the tumbler, acts on the ratchet, b, on the back of the cylinder, and is held up to the ratchet by a spring, c. 121. Alternate increasing and diminishing motion, by means of eccentric toothed wheel and toothed cylinder. 122. Oscillating or pendulum engine. The cylinder swings between trunnions like a pendulum. The piston-rod connects directly with crank. 123. Intermittent rotary motion. The small wheel is driven, and the friction rollers on its studs move the larger wheel by working against the faces of oblique grooves or projections across the face thereof. 124. Longitudinal and rotary motion of the rod is produced by its arrangement between two rotating rollers, the axles of which are oblique to each other. 125. Friction indicator of Roberts. Upon the periphery of the belt-pulley a loaded carriage is placed, its tongue connected with an indicator. With a given load the indicating pointer remains in a given position, no matter what velocity is imparted to the pulley. When the load is changed the indicator changes, thus proving that the friction of wheels is in proportion to load, not to velocity. 126. Circular intermittent rectilinear reciprocating motion. Used on sewing-machines for driving the shuttle; also on three-revolution cylinder printing-presses. 127. Continuous circular into intermittent circular motion. The cam is the driver. 128. Sewing-machine, four-motion feed. The bar, B, carries the feeding-points or spurs, and is pivoted to slide, A. B is lifted by a radial projection on cam C, which at the same time also carries A and B forward. A spring produces the return stroke, and the bar B, drops by gravity. 129 Patent crank motion to obviate dead centres. Pressure on the treadle moves the slotted slide, A, forward until the wrist passes the centre, when the spring, B, forces the slide against the stops until next forward movement.

130. Four-way cock. 131. One stroke of the piston gives a complete revolution to the crank. 132. Rectilinear motion of variable velocity, is given to the vertical bar by rotation of the shaft of the curved arm. 133. Pentagraph for copying, enlarging, and reducing plans, &c. C, fixed point. B, ivory tracing point. With a pencil trace the lines to be copied and B, the pencil, will reproduce it double size. Shift the slide to which C is attached, also the pencil slide, and size for the copy will be varied. 134. Ball and socket joint for tubing. 135. Numerical registering device. The teeth of the worm shaft gear with a pair of worm-wheels of equal diameter, one having one tooth more than the other. If the first wheel has 100 teeth and the second 101, the pointers will indicate respectively 101 and 10.100 revolutions. 136. Montgolfier's hydraulic ram. The right hand valve being kept open by a weight or spring, the current flowing through the pipe in the direction of the arrow, escapes thereby. When the pressure of the water current overcomes the weight of the right valve, the momentum of the water opens the other valve, and the water passes into the air-chamber. On equilibrium taking place, the left valve shuts and the right valve opens. By this alternate action of the valves, water is raised into the air-chamber at every stroke. 137. Rotary engine. Shaft, B, and hub, C, are arranged eccentric to the case. Sliding radial pistons, a, a, move in and out of hub, C. The pistons slide through rolling packings in the hub, C. 138. Quadrant engine. Two single-acting pistons, B, B, connect with crank, D. Steam is admitted to act on the outer sides of the pistons alternately through valve, a, and the exhaust is between the pistons. 139. Circular into rectilinear motion. The scolloped wheel communicates motion to the horizontal oscillating rod, and imparts rectilinear movement to the upright bar. 140. Rotary motion transmitted by rolling contact between two obliquely arranged shafts.

Alloys and their Melting Heats.								fluxes.
No. 1	1	Tin	25	Lead	258	Fahr.	A.	Borax.
2	1	"	10	"	541	"	B.	Salam. or mur. of amm.
3	1	"	5	"	511	"	C.	Muriate or chlor. of zinc
4	1	"	3	"	482	"	D.	Common resin.
5	1	"	2	"	441	"	E.	Venice turpentine.
6	1	"	1	"	370	"	F.	Tallow.
7	1½	"	1	"	334	"	G	Gallipoli oil, or common [sweet oil.
8	2	"	1	"	340	"		
9	3	"	1	"	356	"	Modes of Applying Heat.	
10	4	"	1	"	365	"	*a.*	Naked fire.
11	5	"	1	"	378	"	*b.*	Hollow furnace or muffle.
12	6	"	1	"	381	"	*c.*	Immersion in melted solder.
13	4 Lead	4	Tin	1 Bismuth	320	Fahr.	*d.*	Melted solder or metal poured on.
14	3 "	3	"	1 "	310	"	*e.*	Heated iron, not tinned.
15	2 "	2	"	1 "	292	"	*f.*	Heated copper tool, tinned.
16	1 "	1	"	1 "	254	"	*g.*	Blow Pipe flame.
17	2 "	1	"	2 "	236	"	*h.*	Flame alone, generally alcohol.
18	3 "	5	"	2 "	202	"	*i.*	Stream of heated air.

Bottle Glass.—No. 1. *Dark Green.*—Fused glauber-salts, 11 lbs.; soaper salts, 12 lbs.: waste soap-ashes, ½ bush.; silicious sand, ½ cwt.; glass-skimmings, 22 lbs.; broken green glass, 1 cwt. to 1¼ cwt.; basalt, 25 lbs. to ¼ cwt. No. 2. *Pale Green.*—Pale sand, 100 lbs.; kelp, 35 lbs.; lixiviated wood-ashes, 1¼ cwt.; fresh do., 40 lbs.; pipe-clay, ¾ cwt.; cullet, or broken glass, 1 cwt. No. 3. Yellow or white sand, 120 parts; wood-ashes, 80 parts; pearl-ashes, 20 parts; common salt, 15 parts; white arsenic, 1 part; very pale. *Crystal Glass.*—No. 1. Refined potashes, 60 lbs.; sand, 120 lbs.; chalk, 24 lbs.; nitre and white arsenic, of each, 2 lbs.; oxide of manganese, 1 to 2 oz. No. 2. Pure white sand, 120 parts; refined ashes, 70 parts; saltpetre, 10 parts; white arsenic, ½ part; oxide of manganese, ½ part. No. 3. Sand, 120 parts; red-lead, 50 parts; purified pearl-ash, 40 parts; nitre, 20 parts; manganese, ½ part. *Flask Glass* (*of St. Etienne*).—Pure silicious sand, 61 parts; potash, 3½ parts; lime, 21 parts; heavy spar, 2 parts; oxide of manganese, *q. s.* *Best German Crystal Glass.*—Take 120 lbs. of calcined flints or white sand; best pearl-ash, 70 lbs.; saltpetre, 10 lbs.; arsenic, ½ lb.; and 5 oz. magnesia. No. 2. (*Cheaper.*)—Sand or flint, 120 lbs.; pearlash, 46 lbs.; nitre, 7 lbs.; arsenic, 6 lbs.; magnesia, 5 ozs. This will require a long continuance in the furnace, as do all others when much of the arsenic is used. *Plate Glass.*—No. 1. Pure sand, 40 parts; dry carbonate of soda, 26½ parts; lime, 4 parts; nitre, 1½ parts; broken plate glass, 25 parts. No. 2. *Ure's.*—Quartz-sand, 100 parts; calcined sulphate of soda, 24 parts; lime, 20 parts; cullet of soda-glass, 12 parts. No. 3. *Vienna.*—Sand, 100 parts; calcined sulphate of soda, 50 parts; lime, 20 parts; charcoal, 2¾ parts. No. 4. *French.*—White quartz sand and cullet, of each 300 parts; dry carbonate of soda, 100 parts; slaked lime, 43 parts. *Crown Glass.*—No. 1. Sand, 300 lbs.; soda-ash, 200 lbs.; lime, 30 to 35 lbs.; 200 to 300 lbs. of broken glass. No. 2. (*Bohemian.*)—Pure silicious sand, 63 parts; potash, 22 parts; lime, 12 parts; oxide of manganese, 1 part. No. 3. (*Prof. Schweigger's.*)—Pure sand, 100 lbs.; dry sulphate of soda, 50 parts; dry quicklime in powder, 17 to 20 parts; charcoal, 4 parts. *Product,* white and good.

Best Window Glass.—No. 1. Take of white sand, 60 lbs.; purified pearl-ashes, 30 lbs.; of saltpetre, 15 lbs.; of borax, 1 lb.; of arsenic, ½ lb. This will be very clear and colorless if the ingredients be good, and not be very dear. No. 2. (*Cheaper.*)—White sand, 60 lbs.; unpurified pearl-ashes, 25 lbs.; of common salt, 10 lbs.; nitre, 5 lbs.; arsenic, 2 lbs.; magnesia, 1½ oz. No. 3. *Common green window-glass.*—White sand, 60 lbs.; unpurified

pearl-ashes, 30 lbs.; common salt, 10 lbs.; arsenic, 2 lbs.; magnesia, 2 oz. *Looking-Glass Plate.*—No. 1. Cleansed white sand, 60 lbs.; pearlashes, purified, 25 lbs.; saltpetre, 15 lbs.; borax, 7 lbs. This composition should be continued long in the fire, which should be sometimes strong and afterwards more moderate, that the glass may be entirely free from bubbles before it be worked. No. 2. White sand, 60 lbs.; pearl-ashes, 20 lbs.; common salt, 10 lbs.; nitre, 7 lbs.; borax, 1 lb. This glass will run with as little heat as the former; but it will be more brittle, and refract the rays of light in a greater degree. No. 3. Washed white sand, 60 lbs.; purified pearl-ashes, 25 lbs.; nitre, 15 lbs., borax, 7 lbs. If properly managed, this glass will be colorless. *Window Glass.*—No. 1. Dried sulphate of soda, 11 lbs.; soaper salts, 10 lbs.; lixiviated soap waste, ½ bush.; sand, 50 to 60 lbs.; glass-pot skimmings, 22 lbs.; broken *pale* green glass, 1 cwt. No. 2. (*Paler.*) —White sand, 60 lbs.; pearl-ashes, 30 lbs.. common salt, 10 lbs.; arsenic, 10 lbs,; oxide of manganese, 2 to 4 ozs. No. 3. (*Very Pale.*)—White sand, 60 lbs.; good pot ashes, 25 lbs.: common salt, 10 lbs.; nitre, 5 lbs.; arsenic, 2 lbs.; manganese, 2 to 4 ozs. as required; broken *pale* window glass, 14 lbs.

Glass Staining.—The following colors after having been prepared, and rubbed upon a plate of ground-glass, with the spirits of turpentine or lavender thickened in the air, are applied with a hair-pencil. Before using them, however, it is necessary to try them on small pieces of glass, and expose them to the fire, to ascertain if the desired tone of color is produced. The artist must be guided by these proof-pieces in using his colors. The glass proper for receiving these pigments must be colorless, uniform, and difficult of fusion. A design must be drawn on paper, and placed beneath the plate of glass. The upper side of the glass, being sponged over with gum-water, affords, when dry, a surface proper for receiving the colors without the risk of running irregularly, as they would otherwise do on the slippery glass. The artist draws on the plate (usually in black), with a fine pencil, all the traces which mark the great outlines or shades of the figures. Afterwards, when it is dry, the vitrifying colors are laid on by means of larger hair-pencils; their selection being regulated by the burnt specimen-tints above mentioned. The following are all fast colors, which do not run, except the yellow, which must therefore be laid on the opposite side of the glass. The preparations being all laid on, the glass is ready for being fired in a muffle, in order to fix and bring out the proper colors. The muffle must be made of very refractory fire-clay, flat at its bottom, and only five or six inches high, with a strong arched roof, and close on all sides, to exclude smoke and flame. On the bottom, a smooth bed of sifted lime, freed from water, about half an inch thick, must be prepared for receiving the glass. Sometimes, several plates of glass are laid over each other, with a layer of lime powder between each. The fire is now lighted, and very gradually raised, lest the glass should be broken; then keep it at a full heat for three or four hours, more or less, according to the indications of the trial slips; the yellow coloring being principally watched, it furnishing the best criterion of the state of the others. When all is right, let the fire die out, so as to anneal the glass.

To Stain or Color Glass.—For *amethyst*, oxide of manganese is used; *blue*, oxide of cobalt; for *brown*, oxide of iron; for *green*, black oxide of copper; for *purple*, oxide of gold; for *ruby red*, sub-oxide of copper; for *white*, oxide of tin; for *yellow*, oxide of silver, &c. These substances, pure and well powdered, are either added to the melted contents of the glass-pot, or are applied to the surface as in glass staining. *Fine Blue.* To 10 lbs. of flint glass, previously melted and cast into water, add zaffer, 6 drs.; calcined copper, ½ oz.; prepare by putting sheet copper into a crucible, and exposing it to the action of a fire not strong enough to melt the copper, and you will have the copper in scales, which you pound.—*Bright Purple.* Use 10 lbs. flint glass as before; zaffer, 5 drs.; precipitate of calcium, 1 dr. *Gold Yellow.* Flint glass, 28 lbs., of the tartar which is found in urine, ¼ lb., purify by putting in a crucible on the fire until it ceases to smoke, and add manganese, 2 ozs.

Soluble Glass.—1. Silica, 1 part; carbonate of soda, 2 parts; fuse together. 2. Carbonate of soda (dry), 54 parts; dry carbonate of potassa, 70 parts; silica, 192 parts; soluble in boiling water, yielding a fine, transparent, semi-elastic varnish. 3. Carbonate of potassa (dry), 10 parts; powdered quartz (or sand free from iron or alumina), 15 parts; charcoal, 1 part; all fused together. Soluble in 5 or 6 times its weight of *boiling* water. The filtered solution evaporated to dryness, yields a transparent glass, permanent in the air.

To Cut Glass.—Any hard steel tool will cut glass with great facility when kept wet with camphor dissolved in oil of turpentine. A drill-bow may be used, or even the hand alone. A hole bored may be readily enlarged with a round file. The ragged edges may also be thus easily smoothed by a flat file. Flat window glass can readily be sawed by a watch-spring saw by the aid of this solution. In short, the most brittle glass can be wrought almost as easily as brass by use of cutting tools kept constantly moist with camphorized oil of turpentine.

Stained-Glass Pigments.—No. 1. *Flesh-color.*—Red lead, 1 oz.; red enamel (Venetian glass enamel, from alum and copperas calcined together): grind them to a fine powder, and work this up with alcohol upon a hard stone. When slightly baked, this produces a fine flesh-color. No. 2. *Black color.*—Take 14½ oz. of smithy scales of iron; mix them with 2 oz. of white glass; antimony, 1 oz.; manganese, ½ oz.; pound and grind these ingredients together with strong vinegar. No. 3. *Brown color.*—White glass or enamel, 1 oz.; good manganese, ½ oz.; grind together. No. 4. *Red, Rose, and Brown colors* are made from peroxide of iron, prepared by nitric acid. The flux consists of borax, sand, and minium, in small quantities. *Red color* may likewise be obtained from 1 oz. of red chalk, pounded, mixed with 2 ozs. white, hard enamel, and a little peroxide of copper. A *red* may also be composed of rust of iron, glass of antimony, yellow glass of lead, such as is used by potters, or litharge, each in equal quantities, to which a little sulphuret of silver is added. This composition, well ground, produces a very fine red color on glass. No. 5. *Green.*—2 oz. of brass, calcined into an oxide; 2 oz. of minium, and 8 oz. of white sand; reduce them to a fine powder, which is to be enclosed in a well-luted crucible, and heated strongly in an air furnace for an hour. When the mixture is cold, grind it in a brass mortar. Green may, however, be advantageously produced, by a yellow on one side and a blue on the other. Oxide of chrome has also been employed to stain glass green. No. 6. A *fine yellow stain.*—Take fine silver, laminated thin, dissolve in nitric acid, dilute with abundance of water, and precipitate with solution of sea-salt; mix this chloride of silver in a dry powder, with three times its weight of pipe-clay well burnt and pounded. The back of the glass pane is to be painted with this powder; for, when painted on the face, it is apt to run into the other colors. A *pale yellow* can be made by mixing sulphuret of silver with glass of antimony and yellow ochre, previously calcined to a red brown tint. Work all these powders together, and paint on the back of the glass. Or silver *laminæ*, melted with sulphur and glass of antimony, thrown into cold water and afterwards ground to powder, affords a yellow. A *pale yellow* may be made with the powder resulting from brass, sulphur, and glass of antimony, calcined together in a crucible till they cease to smoke, and then mixed with a little burnt ochre. The *fine yellow* of M. Merand is prepared from chloride of silver, oxide of zinc, and rust of iron. This mixture, simply ground, is applied on the glass. *Orange color.*—Take 1 part of silver powder, as precipitated from the nitrate of the metal, by plates of copper, and washed; mix with 1 part of red ochre, and 1 of yellow, by careful trituration; grind into a thin pap, with oil of turpentine or lavender: apply this with a brush, and burn in.

Neat's Foot Oil.—After the hair and hoofs have been removed from the feet of oxen, they yield, when boiled with water, a peculiar fatty matter, which is known as *Neat's Foot Oil;* after standing, it deposits some

solid fat, which is separated by filtration; the oil then does not congeal at 32°, and is not liable to become rancid. It is often mixed with other oils. This oil is used for various purposes, such as harness dressing, oiling tower clocks, etc. *Tallow Oil.*—The oil is obtained from tallow by pressure. The tallow is melted, and when separated from the ordinary impurities by subsidence, is poured into vessels and allowed to cool slowly to about 80°, when the stearine separates in granules, which may be separated from the liquid part by straining through flannel, and is then pressed, when it yields a fresh portion of liquid oil. It is used in soap manufacture, etc. *Lard oil* is obtained from hog's lard by pressure, when the liquid part separates, while the lard itself becomes much harder. According to Braconet, lard yields 0.62 of its weight of this oil, which is nearly colorless. It is employed for greasing wool, and other purposes.

Economic Lubricators.—1. India rubber, 4 lbs.; dissolved in spts. turpentine; common soda, 10 lbs.; glue, 1 lb.; water, 10 gals.; oil, 10 gals. Dissolve the soda and glue in the water by heat, then add the oil, and lastly the dissolved rubber. 2. *To Lessen Friction in Machinery.*—Grind together black lead with 4 times its weight of lard or tallow. Camphor is sometimes added, 7 lbs. to the hundredweight. 3. *Anti-Friction Grease.*—Tallow, 100 lbs.; palm oil, 70 lbs.; boil together, when cooled to 80°, strain through a sieve, and mix with 28 lbs. soda, and 1½ gals. water. For winter take 25 lbs. more oil in place of the tallow. 4. *Booth's Railway Axle Grease.*—Water, 1 gal.; clean tallow, 3 lbs.; palm oil, 6 lbs.; common soda, ½ lb.; or tallow 2 lbs.; palm oil, 10 lbs. Heat to about 212°, and stir well until it cools to 70°. 5. *Drill Lubricator.*—For wrought iron, use 1 lb. soft soap mixed with 1 gal. of boiling water. It insures good work and clean cutting.

Patent Lubricating Oil.—Water, 1 gal.; clean tallow, 3 lbs.; palm oil, 10 lbs.; common soda, ½ lb. Heat the mixture to about 210° Fahr.; stir well until it cools down to 70° Fahr., when it is fit for use.

Watchmakers' Oil.—Put thin sheet lead into olive oil in a bottle, expose it to the sun for a few weeks, and pour off the clear.

To Manufacture Glue.—This article is usually made from the parings and waste pieces of hides and skins, the refuse of tanneries, the tendons and other offal of slaughter houses. They ought to be obtained and kept in the dry state, to prevent decomposition. For use, they are first steeped for 14 or 15 days in milk of lime, and then drained and dried; this constitutes the cleaning of the preparation. Before conversion into the glue they are usually steeped in weak milk of lime, well worked in water, and exposed to the air for 24 hours. They are then placed in a copper boiler ⅔ filled with water and furnished with a perforated false bottom, to prevent them from burning, and as much is piled on as will fill the vessel and rest on the top of it. Heat is next applied, and gentle boiling continued until the liquor on cooling becomes a gelatinous mass. The clear portion is then run off into another vessel, where it is kept hot by a water bath, and all allowed to repose for some hours to deposit, when it is run into the congealing boxes and placed in a cool situation. The next morning the cold gelatinous mass is turned out upon boards wetted with water, and is cut horizontally in thin cakes with a stretched piece of brass wire, and into smaller cakes with a moistened flat knife. These cakes are placed upon nettings to dry, after which they are dipped one by one in hot water and slightly rubbed with a brush wetted with boiling water, to give them a gloss; they are lastly stove dried for sale. During this time the undissolved skins, etc., left in the copper are treated with water and the whole operation is repeated again and again, as any gelatinous matter is extracted. The first runnings produce the finest and best glue. The refuse matter from the tanners and leather dressers yields on the average, when dried, 50 per cent. of its weight in glue.

Glue.—Powdered chalk added to common glue strengthens it. A glue which will resist the action of water is made by boiling 1 lb. of glue in 2 qts. of skimmed milk.

Cheap Waterproof Glue.—Melt common glue with the smallest possible quantity of water; add, by degrees, linseed oil, rendered drying by boiling it with litharge. While the oil is being added, the ingredients must be well stirred, to incorporate them thoroughly.

Fire and Waterproof Glue.—Mix a handful of quick-lime with 4 ozs. of linseed oil; thoroughly lixiviate the mixture; boil it to a good thickness, and spread it on thin plates in the shade: it will become very hard, but can be dissolved over a fire, like common glue, and is then fit for use

Prepared Liquid Glue.—Take of best white glue, 16 ozs.; white-lead, dry, 4 ozs.; rain-water, 2 pts.; alcohol, 4 ozs. With constant stirring dissolve the glue and lead in the water, by means of a water-bath. Add the alcohol, and continue the heat for a few minutes. Lastly, pour into bottles, while it is still hot.

Glue for Labelling on Metals.—Boiling water, 1 qt.; pulverized borax, 2 ozs.; gum shellac, 4 ozs. Boil till dissolved. Used for attaching labels to metals, or it will do to write inscriptions with, and dust or dab on a little bronze powder over it, varnishing over the bronze.

Marine Glue.—India-rubber, 1 part; coal tar, 12 parts; heat gently, mix, and add 20 parts of powdered shellac, pour out to cool, when used heat to about 250°.

Another Ditto.—Glue, 12 parts; water, sufficient to dissolve; add yellow resin, 3 parts; melt, then add turpentine, 4 parts, mix thoroughly together.

Bank Note Glue.—Dissolve 1 lb. of fine glue or gelatine in water; evaporate it till most of the water is expelled; add ½ lb. of brown sugar, and pour it into moulds.

Parchment Glue.—Parchment shavings, 1 lb.; water, 6 qts. Boil till dissolved, strain and evaporate to right consistence.

Glue to Resist Moisture.—Glue, 5 parts; resin, 4 parts; red ochre, 2 parts; mix with the smallest possible quantity of water.

Gum for Backing Labels.—Mix pure dextrine with boiling water until it assumes the consistency of ordinary mucilage. Apply with a full bodied, evenly made camel's hair brush. The paper should not be too thin or unsized. It will dry quickly and adhere when slightly wet.

Cement for Electrical Machines and Galvanic Troughs.—Melt together 5 lbs. of resin and 1 lb. of beeswax, and stir in 1 lb. of red ochre (highly dried and still warm) and 4 ozs. of plaster of Paris, continuing the heat a little above 212°, and stirring constantly till all frothing ceases, or (for troughs) resin, 6 lbs.; dried red ochre, 1 lb.; calcined plaster of Paris, ½ lb.; linseed oil, ¼ lb.

Hydraulic Cement.—Powdered clay, 3 lbs.; oxide of iron, 1 lb.; and boiled oil to form a stiff paste.

Engineer's Cement.—Equal parts of red and white lead, with drying oil, spread on tow or canvas. An admirable composition for uniting large stones in cisterns.

Stone Cement River.—Sand, 20 parts; litharge, 2 parts; quick-lime, 1 part; mix with linseed oil.

Roman Cement.—Drift sand, 94 parts; unslaked lime, 12 lbs.; and 4 lbs. of the poorest cheese grated; mix well; add hot (not boiling) water to reduce to a proper consistence for plastering. Work well and quick with a thin smooth coat.

Cementing Emery to Wood.—Melt together equal parts of shellac, white resin and carbolic acid in crystals; add the last after the others are melted.

Turners' Cement.—Beeswax, 1 oz.; resin, ½ oz.; pitch, ½ oz.; melt, and stir in fine brick dust.

Cement to Fasten Leather on Top Rollers.—Gum arabic, 2¾ ozs.; isinglass, 2¾ ozs.; dissolve each separately in water and mix.

Cast Iron Cement.—Clean borings, or turnings of cast iron, 16 parts;

sal-ammoniac, 2 parts; flour of sulphur, 1 part; mix them well together in a mortar, and keep them dry. When required for use, take of the mixture, 1 part; clean borings, 20 parts; mix thoroughly, and add a sufficient quantity of water. A little grind-stone dust added, improves the cement.

Cement for Joints of Iron Pipes or Holes in Castings.—Take of iron borings, coarsely powdered, 5 lbs.; of powdered sal-ammoniac, 2 ozs.; of sulphur, 1 oz.; and water sufficient to moisten it. This composition hardens rapidly, but, if time can be allowed it sets more firmly without the sulphur. Use as soon as mixed, and ram tightly into the joints or holes.

Best Cement for Aquaria.—One part, by measure, say a gill of litharge; 1 gill of plaster of Paris; 1 gill of dry, white sand; ½ of a gill of finely powdered resin. Sift, and keep corked tight until required for use, when it is to be made into a putty by mixing in boiled oil (linseed) with a little patent drier added. Never use it after it has been mixed (that is, with the oil), over fifteen hours. This cement can be used for marine as well as fresh water aquaria, as it resists the action of salt water. The tank can be used immediately, but it is best to give it three or four hours to dry.

Another.—Mix equal quantities of any white lead and red lead to a paste with mastic varnish and use as soon as mixed.

Strong Cement for Steam Joints.—White lead ground in oil, 10 parts; black oxide of manganese, 3 parts; litharge, 1 part. Reduce to the proper consistency with boiled linseed oil and apply.

Cement for Holes or Cracks.—Red lead ground in oil, 6 parts, white lead, 3 parts, oxide of manganese, 2 parts, silicate of soda, 1 part, litharge, ½ part; all mixed and used as putty.

Air and Water tight Cement for Casks and Cisterns.—Melted glue, 2 parts; linseed oil, 4 parts, boiled into a varnish with litharge; hardens in 48 hours.

Gasfitters' Cement.—Mix together resin, 4¼ parts; wax, 1 part; and Venetian red, 3 parts.

Plumbers' Cement.—Black resin, 1 part; brick dust, 2 parts; well incorporated by a melting heat.

Coppersmiths' Cement.—Boiled linseed oil and red lead mixed together into a putty, are often used by coppersmiths and engineers to secure joints; the washers of leather or cloth are smeared with this mixture in a pasty state.

Cement for External Use.—Ashes, 2 parts; clay, 3 parts; sand, 1 part; mix with a little oil, very durable.

Cement to Resist Red Heat and Boiling Water.—To 4 or 5 parts of clay, thoroughly dried and pulverized, add 2 parts of fine iron filings free from oxide, 1 part of peroxyde of manganese, 1 part of common salt, and ½ part of borax. Mingle thoroughly, render as fine as possible, then reduce to thick paste with the necessary quantity of water, mixing well; use immediately, and apply heat, gradually increasing almost to a white heat.

Cement to Join Sections of Cast-Iron Wheels, etc.—Make a paste of pure oxide of lead, litharge, and concentrated glycerine. Unrivalled for fastening stone to stone, or iron to iron.

Cement for Mending Stone and Earthenware.—Take half a pint of strong vinegar and a pint of new milk; let it stand until it separates; drain the whey from the curd, and mix into the curd sifted marl-lime, to make it the consistency of putty, apply it to the edges and join immediately, let it stand a few days. If the jar is cracked, paste a piece of strong cloth over the fracture with the cement.

Cement for Mending China.—Take a very thick solution of gum-arabic and water; stir in the flour of plaster-of-Paris until it becomes a thinnish paste; apply with a brush to the broken edges, and place them together; let them dry awhile. The whiteness of the cement renders this recipe doubly valuable.

To Cement Broken China.—Beat lime into the most impalpable pow-

der, sift it through fine muslin; then tie some into a thin muslin, put on the *edges* of the broken china some white of egg, then dust some lime quickly on the *same*, and unite them exactly.

Asbestos Powder as a Cement.—Asbestos powder made into a thick paste with the liquid silicate of soda, according to a leading English authority, is stated to be found to be of great advantage for making joints, fitting taps, connecting pipes, and filling cracks in retorts. It is said to be of great service in the manufacture of nitric acid, sulphuric acid, and other products, because it can be easily made as applied, hardening rapidly, and preventing the escape of acid vapors.

Cement for Alabaster.—Take of white beeswax one pound, of resin a pound, and three quarters of alabaster. Melt the wax and resin, then strew the alabaster over it lightly, (which should be previously reduced to a fine powder.) Stir the whole well together, then knead the mass in water, in order to incorporate the alabaster thoroughly with the resin and wax. The alabaster, when mended, should be perfectly dry, and heated. The cement, when applied, should also be heated. Join the broken pieces, bind them, and let them remain a week. This composition, when properly managed, forms an extremely strong cement.

Cement for Iron-ware.—Beat the whites of eggs to a froth, then stir into them enough quicklime to make a consistent paste, then add iron file dust to make a thick paste. The quicklime should be reduced to a fine powder before mixing it with the eggs. Fill the cracks in iron-ware with this cement, and let them remain several weeks before using them.

Transparent Cement for Glass.—Dissolve 1 part india-rubber in chloroform, and add 16 parts by measure of gum mastic in powder. Digest for 2 days, shaking the bottle frequently; apply with a fine camel's hair brush.

Cement for Petroleum Lamps.—Boil 3 parts of resin with 1 part of caustic soda and 5 of water. The composition is then mixed with half its weight of plaster of Paris, and sets firmly in ½ to ¾ of an hour. It is of great adhesive power, not permeable to petroleum, a low conductor of heat, and but superficially attacked by hot water.

For Lute, or cement for closing joints of apparatus, mix Paris plaster with water to a soft paste, and apply it at once. It bears nearly a red heat. To render it impervious, rub it over with wax and oil.

Roman Cement.—Slaked lime, 1 bush.; green copperas, 3½ lbs., fine gravel sand, ½ bush. Dissolve the copperas in hot water, and mix all together to the proper consistency for use; use the day it is mixed and keep stirring it with a stick while in use.

Vicat's Hydraulic Cement is prepared by stirring into water a mixture of 4 parts chalk and 1 part clay; mix with a vertical wheel in a circular trough, letting it run out in a large receiver. A deposit soon takes place which is formed into small bricks, which, after being dried in the sun, are moderately calcined. It enlarges about ⅔ when mixed with water.

Rust Joint, Quick Setting.—Sal-ammoniac pulverized, 1 lb.; flour of sulphur, 2 lbs.; iron borings, 80 lbs.; mix to a paste with water in quantities as required for immediate use.

Quick Setting Joint Better than the Last, but Requires More Time to Set.—Sal-ammoniac, 2 lbs.; sulphur, 1 lb.; iron filings, 206 lbs.

Jewellers' Armenian Cement.—Isinglass soaked in water and dissolved in spirit, 2 ozs. (thick); dissolve in this 10 grs. of very pale gum ammonia (in tears) by rubbing them together; then add 6 large tears of gum mastic, dissolved in the least possible quantity of rectified spirits. When carefully made this cement resists moisture and dries colorless. Keep in a closely stopped phial.

Jewellers' Cement.—Put in a bottle 2 ozs. of isinglass and 1 oz. of the best gum arabic, cover them with proof spirits, cork loosely, and place the bottle in a vessel of water, and boil it till a thorough solution is effected; then strain it for use.

SEALING CEMENT.—To secure letters and packages from being opened or tampered with, beat up some fine bean flour with the white of an egg, and make it into a paste. Use a little of it in the form of water, close the letters, etc., with it, and hold the sealed part to the spout of a tea-pot containing boiling water. The steam will harden the cement to that degree that the letter cannot be opened without tearing it, and will thus prove more secure than gum, wafer, or wax.

LITHOGRAPHIC INK.—Venice turpentine, 1 part; lampblack, 2 parts; hard tallow soap, 6 parts; mastic in tears, 8 parts; shellac, 12 parts; wax, 16 parts; melt, stir, and pour it out on a slab.

INDELIBLE INK FOR MARKING LINEN WITHOUT PREPARATION.—Nitrate of silver, 1½ oz.; dissolved in 6 oz. liquor ammoniæ fortis, orchil, for coloring, 1 oz.; gum mucilage, 12 oz. The best extant.

BLACK STENCIL INK.—Triturate together 1 pint pine soot and 2 pints Prussian blue with a little glycerine, then add 3 pints gum arabic and sufficient glycerine to form a thick paste.

INDELIBLE STENCIL INKS.—1. Varnish, such as is used for ordinary printing ink, 1 lb.; black sulphuret of mercury, 1 lb.; nitrate of silver, 1 oz.; sulphate of iron, 1 oz.; lampblack, 2 tablespoonfuls. Grind all well together; thin with spirits turpentine as desired. 2. Sulphate of manganese, 2 parts; lampblack, 1 part; sugar, 4 parts; all in fine powder and triturated to a paste in a little water. *Permanent Red.*—Vermilion, 4 parts; sulphate of iron, 1 part; drying oil to mix. Any other color will answer besides red.

BLUE RULING INK.—Good vitriol, 4 ozs.; indigo, 1 oz.; pulverize the indigo, add it to the vitriol, let it stand exposed to the air for 6 days, or until dissolved; then fill the pots with chalk, add fresh gall, ½ gill, boiling it before use.

BLACK RULING INK.—Take good black ink, and add gall as for blue; do not cork it, as it prevents it from turning black.

PROF. BOTTGER'S PORTABLE INK.—Make the strongest possible solution of aniline black in water or alcohol, and soak thick unsized paper thoroughly to imbibe mixture, and then dry. Put in a bottle, and add water as required.

TICKETING INK FOR GROCERS, &C.—Dissolve 1 oz. of gum arabic in 6 oz. water, and strain; this is the mucilage; for *black color* use drop black, powdered, and ground with the mucilage to extreme fineness; for *blue*, ultramarine is used in the same manner; for *green*, emerald green; for *white*, flake white; for *red*, vermilion, lake, or carmine; for *yellow*, chrome yellow. When ground too thick they are thinned with a little water. Apply to the cards with a small brush. The cards may be sized with a thin glue, and afterwards varnished, if it is desired to preserve them.

PREMIUM BLACK WRITING INK.—Take 2 oz. extract logwood; 1 gal. soft water; boil slightly, or simmer in an iron vessel 15 minutes; dissolve in a little hot water 24 grains bichromate of potash, 12 grains prussiate of potash, and stir into the liquid a few minutes while over the fire; take off, and when settled, strain it twice through common muslin or sheeting cloth. The above ink is a jet black from the first, flows beautifully from the pen, and is so indelible that even oxalic acid will not remove it from paper, and costs, when made in large quantities, only 4 cents per gallon.

SUPERIOR BLUE INK.—Prussian blue, 6 parts; oxalic acid, 1 part; triturate with a little water to a perfectly smooth paste, and dilute with the proper quantity of water. Add gum arabic.

HORTICULTURAL INK.—Copper, 1 part; dissolve in nitric acid, 10 parts, and add water, 10 parts; used to write on zinc, or tin labels.

INKS.—*Fine Black Writing Ink.*—To 2 gals. of a strong decoction of logwood, well strained, add 1½ lbs. blue galls in coarse powder, 6 ozs. sulphate of iron, 1 oz. acetate of copper, 6 oz. of well ground sugar, and 8 oz. gum arabic. Set the above on the fire until it begins to boil, strain, and then set it away until it has acquired the desired black. 2. *Green Ink.*—Cream of tartar, 1 part; verdigris, 2 parts; water, 8 parts. Boil till reduced to the

proper color. 3. *Blue Ink.*—Take sulphate of indigo, dilute it with water till it produces the required color. 4. *Violet Ink.*—Is made by dissolving some violet aniline in water to which some alcohol has been added; it takes very little aniline to make a large quantity of the ink. 5. *Gold Ink.*—Mosaic gold, 2 parts; gum arabic, 1 part; rubbed up to a proper condition. 6. *Silver Ink.*—Triturate in a mortar equal parts of silver foil and sulphate of potassa, until reduced to a fine powder, then wash the salt out, and mix the residue with a mucilage of equal parts of gum arabic water. 7. *Fullam's Recipe for Indelible Stencil-plate Ink.*—1 lb. precipitate carbonate of iron, 1 lb. sulphate of iron, 1¼ lbs. acetic acid. Stir over a fire until they combine, then add 3 lbs. printer's varnish and 2 lbs. fine book ink, and stir until well mixed. Add 1 lb. of Ethiop's mineral. 8. *Exchequer Ink.*—Bruised galls, 40 lbs.; gum, 10 lbs.; green sulphate of iron, 9 lbs.; soft water, 45 gals. Macerate for 3 weeks with frequent agitation and strain. This ink will endure for ages. 9. *Asiatic Ink.*—Bruised galls, 14 lbs.; gum, 5 lbs. Put them in a small cask, and add of boiling soft water, 15 gals. Allow the whole to macerate, with frequent agitation, for two weeks, then further add green copperas, 5 lbs., dissolved in 7 pts. water. Again mix well, and agitate the whole daily for 2 or 3 weeks. 10. *Extra Good Black Ink.*—Bruised galls, 2 lbs.; logwood chips, green copperas, and gum, of each 1 lb.; water, 7 gals. Boil 2 hours and strain. Product, 5 gals. 11. *Brown Ink.*—A strong decoction of catechu. The shade may be varied by the cautious addition of a little weak solution of bichromate of potash. 12. *Indelible Ink.*—Nitrate of silver, ¼ oz.; water, ¾ oz. Dissolve, add as much of the strongest liquor of ammonia as will dissolve the precipitate formed on its first addition; then add of mucilage 1½ dr., and a little sap green, syrup of buckthorn, or finely powdered indigo, to color. Turns black on being held near the fire, or touched with a hot iron. 13. *Indelible Ink for Glass or Metal.*—Borax, 1 oz.; shellac, 2 ozs.; water, 18 fluid ozs.; boil in a covered vessel; add of thick mucilage, 1 oz.; triturate it with levigated indigo and lamp-black q. s., to give it a good color. After 2 hours' repose, decant from the dregs and bottle for use. It may be bronzed after being applied. Resists moisture, chlorine, and acids. 14. *Common Ink.*—To 1 gal. boiling soft water add ¾ oz. extract log-wood; boil 2 minutes; remove from the fire, and stir in 48 grains bichromate of potash, and 8 grains prussiate of potash; for 10 gals. use 6½ ozs. logwood extract, 1 oz. bichromate of potash, and 80 grains prussiate of potash; strain. 15. *Black Copying Ink, or Writing Fluid.*—Take 2 gals. rain water and put into it gum arabic, ½ lb.; brown sugar, ½ lb.; clean copperas, ¼ lb.; powdered nutgalls, ¾ lb.; mix, and shake occasionally for 10 days and strain; if needed sooner, let it stand in an iron kettle until the strength is obtained. This ink will stand the action of the atmosphere for centuries, if required. 16. *Red Ink.*—In an ounce phial put 1 teaspoonful of aqua-ammonia; gum arabic, size of 2 or 3 peas; and 6 grs. No. 40 carmine; fill up with soft water, and it is soon ready for use.

Luminous Ink—Shines in the Dark.—Phosphorus, half drachm; oil cinnamon, half ounce; mix in phial, cork tightly, heat it slowly until mixed. A letter written with this ink can only be read in a dark room, when the writing will have the appearance of fire.

Yellow Ink.—A little alum, added to saffron, in soft hot water, makes a beautiful yellow ink.

Invisible Ink.—Sulphuric acid, 1 part; water, 20 parts; mix together and write with a quill pen, which writing can be read only after heating it.

Red Ruling Ink.—Best carmine, 4 grs.; rain water, 1 oz.; aqua-ammonia, 40 drops. A little gum arabic water may be added.

Marking Ink.—This ink may be made after a variety of methods; the following is one of the best; dissolve separately an ounce of nitrate of silver and an ounce and a half of carbonate of soda in distilled or rain water. Mix the solutions, and collect and wash the precipitate in a filter, whilst still moist; rub it up in a marble or Wedgwood mortar, with 3 drachms tartaric acid; add 2 oz. of distilled water, mix 6 drachms of white sugar, and 10

drachms of powdered gum arabic, half an ounce of orchil and water to make up 6 ozs. in measure. Apply with a clean quill pen. *Red Marking Ink* may be compounded thus: take half an ounce of vermilion, and a drachm of salt of steel; let them be finely levigated with linseed oil, to the thickness or limpidity required for the occasion. The ink thus obtained has not only an attractive appearance, but will be found perfectly to resist the action of acids, as well as of all alkaline lyes; it may be employed with either a hair pencil or a pen. *Marking ink may be removed from linen* by a saturated solution of cyanuret of potassium, applied with a camel's-hair brush. After the marking-ink has disappeared, the part should be well washed in cold water.

Ink-Marking.—Dissolve, separately, 1 oz. of nitrate of silver and an ounce and a half of sub-carbonate of soda in distilled rain water. Mix the solutions, and correct and wash the precipitate in a filter; while still moist, rub it upon a marble or Wedgwood mortar, with three drachms of carbonic acid; add 2 oz. of distilled water, mix 6 oz. of white sugar, 10 drachms of powdered gum arabic, and half an ounce of orchil and water; put into bottles and cork securely.

Ink, Sympathetic.—With a clean pen, write on paper with a solution of muriate of cobalt, so diluted with water that the writing, when dry, will be invisible. On gently warming the paper, the writing will appear of a blue or greenish color, which will disappear again when cool. A solution of muriate of copper forms a yellow and sympathetic ink, and acetate of cobalt a rose or purple. If a landscape be drawn representing a winter scene, the paper being overlaid in the place where the foliage should be, with the green sympathetic ink, then on gently warming the drawing, it will represent summer. Sky and water may be drawn with the blue, and standing corn with the yellow ink.

Ink, Writing.—Boil 8 oz. of galls, in coarse powder, and 4 oz. of logwood, in thin chips, in 12 pints of rain water, for one hour; strain the liquor, and add 4 oz. of green copperas, 3 oz. of powdered gum arabic, 1 oz. of blue vitriol, and 1 oz. of coarse sugar; stir the mixture until the whole be dissolved, then let it subside for 24 hours; strain it off speedily, and put it by in stone bottles for use. An excellent ink, suitable for writing with steel pens, which it does not corrode, may be made as follows: 60 grs. of caustic soda, a pint of water, and as much Indian ink as is required for producing a proper blackness.

Sealing Wax.—Take four ounces of shell-lac, one ounce of Venice turpentine, and three ounces of vermilion. Melt the lac in a copper pan suspended over a clear charcoal fire, then pour the turpentine slowly into it, and soon afterwards add the vermilion, stirring briskly all the time of the mixture with a rod in either hand. In forming the round sticks of sealing-wax a certain portion of the mass should be weighed while it is ductile, divided into the desired number of pieces, and then rolled out upon a warm marble slab by means of a smooth wooden block like that used by apothecaries for rolling a mass of pills. The oval sticks of sealing-wax are cast in moulds with the above compound in a state of fusion. The marks of the lines of junction of the mould-box may be afterwards removed by holding the sticks over a clear fire or passing them over a blue gas-flame. Marble sealing-wax is made by mixing two, three, or more colored kinds while they are in a semi-fluid state. From the viscidity of the several masses, their incorporation is left incomplete so as to produce the appearance of marbling. Gold sealing-wax is made simply by stirring gold-colored mica spangles into the musk or other perfume. If one part of balsam of Peru be melted along with ninety-nine parts of the sealing-wax composition, an agreeable fragrance will be exhaled in the act of sealing with it. Either lamp-black or ivory-black serves for the coloring-matter of black-wax. Sealing-wax is often adulterated with resin, in which case it runs into thin drops at the flame of a candle.

On Melting and Refining.—In melting *Brass Gold,* urge the fire to a

great heat, and stir the metal with the long stem of a tobacco pipe to prevent honey-combing. If *Steel* or *Iron filings* get into gold while melting, throw in a piece of sandiver the size of a common nut: it will attract the iron or steel from the gold into the flux, or sublimate of mercury will destroy the iron or steel. To cause *Gold to roll well*, melt with a good heat, add a teaspoonful of sal ammoniac and charcoal, equal quantities, both pulverized, stir up well, put on the cover for 2 minutes, and pour.

Black having a Polish for Iron.—Pulverized gum asphaltum, 2 lbs.; gum benzoin, ¼ lb.; spirits of turpentine, 1 gal.; to make quick, keep in a warm place, and shake often; shade to suit with finely ground ivory black. Apply with a brush. It ought to be used on iron exposed to the weather as well as on inside work desiring a nice appearance or polish.

Coins.—The national coins of the United States are of three kinds, viz: gold, silver, and copper.

1. The gold coins are the *eagle, the double eagle, half eagle, quarter eagle, and gold dollar.*

The eagle contains 258 grains of *standard* gold; the double eagle, half eagle, and quarter eagle, like proportions.

2. The silver coins are the *dollar, half dollar, quarter dollar,* the *dime, half dime,* and *three-cent-piece.*

The dollar contains 412½ grs.; the half dollar, 192 grs.; the quarter dollar, 96 grs.; the dime, 38.4 grs.; the half dime, 19.2 grs.

3. The copper coins are the *cent,* and *half cent.*

The cent contains 168 grains of *pure* copper, the half cent, a like proportion. Mils are not coined.

The fineness of gold used for coin, jewelry, and other purposes, also the gold of commerce, is estimated by the number of parts of gold which it contains. Pure gold is commonly supposed to be divided into 24 equal parts, called *carats.* Hence, if it contains 10 parts of *alloy,* or some *baser* metal, it is said to be 14 carats fine; if 5 parts of alloy, 19 carats fine; and when absolutely pure, it is 24 carats fine.

The present *standard* for both *gold* and *silver coins* of the United States, by Act of Congress, 1837, is 900 parts of pure metal by weight to 100 parts of alloy. The alloy of gold coin is composed of silver and copper, the silver not to exceed the copper in weight. The alloy of silver coin is pure copper.

To Clean Light Kid Gloves.—Magnesia, moist bread, and India rubber, are all of them good to clean light kid gloves. They should be rubbed on the gloves thoroughly. If so much soiled that they cannot be cleaned, sew up the tops of the gloves, and rub them over with a sponge dipped in a decoction of saffron and water. The gloves will be yellow or brown, according to the strength of the decoction.

Waterproof for Porous Cloth.—Dissolve 2¼ lbs. alum in 4 gals. water; dissolve also in a separate vessel the same weight of acetate of lead in the same quantity of water. When both are well dissolved, mix the solutions together; and when the sulphate of lead resulting from this mixture has been precipitated to the bottom of the vessel in the form of a powder, pour off the solution, and plunge into it the fabric to be rendered waterproof. Wash and rub it well during a few minutes, and hang it in the air to dry.

To Restore Rusty Italian Crapes.—Skim-milk and water, with a bit of glue in it, heated scalding hot, will make old rusty-black Italian crape look as well, if not better, than new. It should be clapped and pulled dry, like nice muslin.

Potter's Invisible Waterproofing.—Imbue the cloth on the wrong side with a solution of isinglass, alum, and soap dissolved in water, forming an emulsion of a milky thickness: apply with a brush, rubbing in well. When dry it is brushed on the wrong side against the grain, and then gone over with a brush dipped in water; and afterwards brushed down smooth.

APPENDIX TO BREWING, WINE & SPIRIT MANUFACTURERS, &C.

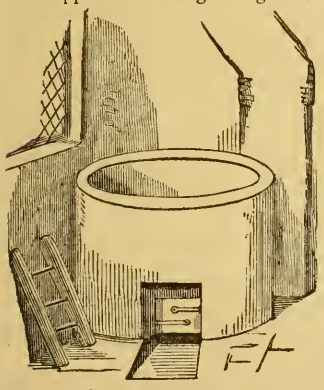
THE ART OF BREWING.

The Utensils Employed, the Ingredients Used, the Various Operations Performed, the Mash Tub, the Underback, the Cooler, the Thermometer, &c., &c.

Brewing.—The process of brewing ought to form a part of the domestic economy of every family, for similar reasons as those that apply to home made bread, namely, that the article thus produced may be obtained much purer and for a far less cost than when purchased from the brewer or the publican. Brewing is not a difficult art, a great deal depends upon proper management and strict attention to certain definite rules; and whatever obstacles may present themselves at the outset will soon be overcome by practice and personal experience.

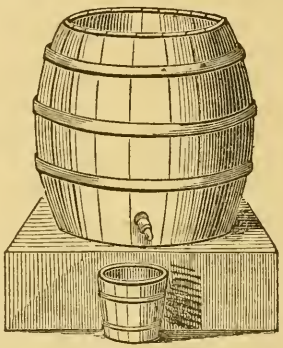
The process of brewing may be divided into three distinct heads—1. The utensils employed. 2. The ingredients used. 3. The various operations performed.

1. The Utensils. *The Copper* is used for heating the water; sometimes it is fixed for the purpose, if the brewing be on a tolerable scale; or in a portable one, if the brewing be limited; in short, the size of the copper must depend upon the extent of the establishment, and what is required; the copper in the engraving is a fixed one, of the smallest size. But it is not absolutely necessary that a copper should be designed purposely for brewing; the ordinary washing copper with which every house is furnished may be employed. If this be the case the size of the copper will determine the extent of the brewing. If it be required to brew two kinds of beer at the same time, namely, nine gallons of ale, and nine gallons of table beer, the capacity of the copper should not be less than thirteen gallons. If one kind of beer be only required, then, for each nine gallons the copper should contain, if the whole quantity of grist be mashed only once, thirteen gallons; if the mashing be performed in two separate operations, seven gallons; if in three operations, five gallons. It is not economical to exceed these capacities, at least, not to extend them to fifteen, nine, or seven gallons. To save time and labor it is desirable that the copper be placed, if it can be conveniently done, at such a height as will allow the water to run from it into the mash tub, by means of a wooden spout or gutter. Much trouble, besides waste, will also be avoided if the copper be

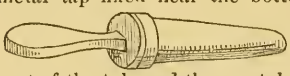


furnished with a metal tap; but, instead of having it soldered in, it is better when consisting simply of a pipe of sheet copper coming out level with the bottom and projecting beyond the brickwork in which the copper is fixed. Into this tube the tap may be easily secured, as is done by fixing it in a cask, and again removed as occasion may require. The tap should be of a size sufficient to prevent its being choked by the hops in drawing off the malt wort.

The Mash Tub is the vessel which is to hold all the ground malt or grist,



and water enough to make the infusion or sweet wort for ale. It is generally made of wooden staves, fixed by hoops of iron or wood; two-thirds of any broad bottomed cask or barrel will do for this purpose. All that is essentially necessary is to have the vessel capacious enough to hold the malt and water to be infused, with a contrivance at the bottom to let off the infusion or sweet wort into another vessel. For this purpose some have a metal tap fixed near the bottom, but in cheaper apparatus a spigot and faucet is found sufficient for those who cannot afford the other. This is merely driven tight into the hole in the lower part of the tub, and the peg takes out. The objection to this contrivance, however, is that it is apt to swell by the hot liquid, and in attempting to draw off the wort, the apparatus may be forcibly pulled out altogether. The size of the mash tub must be adapted to the mode of brewing to be pursued. A smaller or larger mash tub will be required for the same quantity of liquor, according to the number of mashes it is to undergo. But in any case it should be large enough to hold the whole of the wort of which the ale is made, and all the malt, and there should be likewise room enough left to mash in; for this purpose the liquor should not reach above five to six inches from the edge of the mash tub.



The Under-back is a shallow tub placed below the mashing tun, for the wort to run off into when drawn from the grains. Its size is proportioned to that of the mashing tun. It is best to be large enough to hold all the wort of one mashing, that the wort may not be cooled by being transferred into other vessels previous to boiling. This tub should have its capacity divided into gallons, that the quantity of wort from each mash contained in it may at once be known by mere inspection.

The Cooler is a flat tub used for the purpose of cooling the wort before it is fermented; common washing tubs will answer this purpose tolerably well. For each nine gallons of liquor to be brewed let these tubs contain in the whole fourteen gallons, which may be divided in the following manner, and from these sizes a calculation for any greater scale may be readily made; the larger tub, in each case, being intended to serve in the three-

fold capacity of *receiver, cooler,* and *gyle-tun.* For a brewing of eighteen gallons, one sixteen gallon and one twelve gallon tub are required. For twenty-seven gallons one tub of eighteen gallons, and two tubs of twelve gallons, are necessary. To brew a barrel, the larger tub should have a capacity equal to thirty gallons, while each of the other two should be able to hold thirteen gallons.

The Thermometer is found of great service to the brewer, and should always be employed where accuracy is required. By it the proper heat of the mash is regulated, and of the worts when drawn from the mash tun. It indicates when the worts in the coolers are of the proper temperature to begin the fermentation, and it marks the progress of this process by the increase or diminution of heat. For this purpose a common thermometer with a metal scale, enclosed in a tin case, will do.

2. The Ingredients used.—These consist of malt, hops, water, and yeast. *The Malt* is chosen according to the intended character of the brewing; pale, amber, high-dried, or any mixture of them, as the occasion may require. The amber-colored is best adapted for general brewing, but pale malt is preferable for brewing in a small way; either may be procured of any respectable maltster. Malt varies much in *quality*; when good its grains are large, full of flour and plump; they break easily between the teeth, and if drawn across a board leave a chalky trace. The shell or husk also should be thin and brittle. When the malt is purchased, inquiry should be made, whether it is old or new. If the malt be new, it should be left exposed to the open air one or two days after grinding, before it is used. If it be old, it will be better to have it ground on one day and brewed the next without allowing it to stand after it is broken. It should be bruised moderately small, so that every grain be crushed: but if ground very fine, it will clog the mash and impede the draining of the wort. The *quantity* of malt used in domestic brewing may be regulated as follows:—If the beer be not intended for keeping, one bushel of malt will make twelve gallons of common or table ale. Or from one bushel of malt may be brewed twenty-four gallons of table beer, without any table ale, or nine gallons of ale, and six of table beer, or six of ale and twelve of table beer, or any other proportions, bearing in mind that the *common* ale and table beer are here considered as two of table beer, being equal to one of ale. This is the smallest quantity of malt that should be employed for brewing twelve gallons of good table or common ale. It must be understood, that the malt be measured before it is ground, because a bushel of malt by measure produces, when coarsely ground, one bushel and a quarter of grist, and when finely ground, the increase of bulk is still more considerable; hence, if the malt be purchased in a ground state, this allowance must be made accordingly. *Hops,* like malt, vary much in quality; the best are of a bright color between yellow and green, of a pungent fragrant smell, and when rubbed between the hands, of a glutinous character; if any brownness of color appears on them, it is a sign that their qualities have partially perished. They should be chosen free from leaves, stems, &c., and be kept in a dry place closely packed, or they will become damp and mildewed. Hops do not keep perfectly good for more than a year, and therefore it is best to procure them of the present year's growth. The *quantity* of hops used may be regulated according to the palate. One pound of hops to a bushel of malt produces a pleasant bitter, and is considered a good proportion, but less may be used if the draught is quick. The *water* best adapted for brewing is variously estimated, some giving the preference to soft water, and others to hard. But it may be considered that any kind of good drinkable fresh water will do for brewing, provided it be free from impregnations derived from stagnant pools or ponds containing decayed animal and vegetable substances. In all cases it is advisable that the water should be allowed a sufficient time to settle before it is used. *The yeast* must be sweet and good, for upon that circumstance proper fermentation mainly depends. The best yeast is that which is collected at the top, and which has become

a dense tough froth, formed when the fermentation has been a good deal advanced. What has fallen to the bottom, or the ground yeast, is not so powerful. Though yeast can be kept, yet new yeast is more active than old. Yeast is also liable to become putrid by keeping, and the smallest quantity of this, or the least tendency to it, will inoculate a whole tun. The *quantity* of yeast that should be used cannot be the same exactly for all cases, for it must depend partly on the quality of the beer, and upon the season: in most cases a larger quantity of yeast will have the same effect as a higher degree of heat in exciting the fermentation, and a smaller quantity will be equivalent to a lower temperature; but, in general, a gallon for four barrels may be stated as the usual proportion when the wort is from 60 to 70 degrees; if the heat be greater a smaller quantity will be sufficient.

3. *The operations* in the process of brewing are, mashing, boiling, cooling, fermentation, and cleansing. *Mashing* is extracting from the ground malt, by the addition of hot water, the infusion or wort. During the process of mashing, a peculiar principle contained in the malt, called by chemists *diastase*, reacts upon the starch with which it is associated, and converts it first into a kind of gum, and ultimately into a species of grape sugar. The more perfectly this is effected, the richer will be the resulting wort in sugar or "*saccharine*," and the stronger and more alcoholic the beer produced by its fermentation. Mashing is effected by three distinct processes. The action of the first mash is merely to extract the sugar contained ready formed in the malt; that of the second to convert the starch into sugar by the action of the diastase; and that of the third to fully complete the last-named object, as well as to carry away the remaining portion of extract left from the second mash. The quantity of water to be employed for obtaining the different mashes must be determined by the relative capacities of the mash tub and the copper; care should be always taken to employ so much for the first mash as will keep a sufficient quantity in the copper to prevent its being injured by the fire. When you commence the process of mashing, fix the mash tub in a convenient situation, and in a slightly slanting position, so that it may readily receive the water from the copper, and also allow sufficient room for the person who is to stir the mash. Then having adapted to the orifice of the spigot or tap that projects within the tub, a wicker strainer covered with a case of close canvas, to prevent the grains and fine flour from passing through, pour in the mash tub ten gallons of boiling water, for every five pecks of malt to be employed. When the water has cooled down to 160 degrees in summer, or 170 in winter, let one person gradually pour the malt into the tub, while another stirs and mixes it with the water. Then thoroughly agitate the whole mixture, and keep stirring for twenty or thirty minutes, in order that every particle of malt may become completely saturated. After which cover the mash tub closely with malt sacks, cloths, or whatever else is handy, to keep in the steam.

When the mash has stood for at least one hour and a half in winter, and one hour in summer, draw off a few quarts of wort into the under-back, and return it into the mash tub, that it may run off clear; when it runs clear, draw off the whole as quickly as possible. During the time the first mash is standing on the malt, refill your copper with water, and bring it to the heat of 190 degrees for the second mash; and when the first mash has run off, ladle as much water on the malt as will make it of the same consistence as the first mash. If the brewing be intended only for nine gallons of beer per bushel of malt, five and a half gallons of water is the proportion required for the second mash. Let the water be poured on the malt by one person, while another plies the "oar" for at least half an hour. If it be intended to brew only one kind of liquor, the second wort may run into the same receiver containing the first wort. The second mash must stand for an hour and a half, and then be drawn off as quickly as possible. The third mash should be made by adding the remaining portion of the water heated to 200 degrees, this should be well stirred and stand for an hour. Although

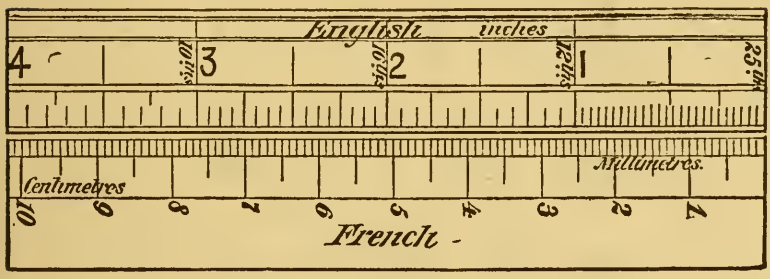
three separate operations of mashing are here stated, if time or convenience does not admit of this proceeding, the grist may be mashed in two operations only, with the whole allowance of water to be employed; in that case a quantity of water will be seen lying on the top of the malt, the mash being too thin, and a portion of the extractive matter remains in the grain which is mashed out by the second mash. But it is always preferable to make three mashes. When you have mashed a third time you may proceed with the process of *boiling*. Empty your copper of water, and, if it will hold the whole of the wort, fill it with the first and second worts together with the hops, and likewise your third wort, as soon as it has run off; if the copper be not large enough to boil at once, mix your worts together, and boil them twice; taking care to add the hops of the first boiling to the second. Boil the mixture till the liquor *breaks*, or becomes clouded with large fleecy flakes. This will take place probably when the wort has been boiled about one hour. The breaking or curdling is best observed by taking a basinful of the wort out of the copper and suffering it to cool, when the flakes will be seen distinctly in the wort. Whilst the boiling is going on, arrange the tubs for the cooling process, by raising them from the floor on to a support, to allow a free circulation of air beneath them; then place a hair sieve over it, supported by a frame of four pieces of wood joined ladder-wise, and resting on the edge of the tub, strain the boiled liquor through the sieve. Put the hops back into the copper, and boil them again with the second and third wort. *Cooling* is the next process, the object of which is to reduce the temperature of the liquor as quickly as possible, in order to avoid acidity or "souring." When the boiling is finished, the mash tub must be cleared of the grains, and after rinsing it with water, fill it with the boiled wort, and put it in a place where it is not exposed to a current of cold air, to serve as a gyle tun for the wort. When the contents of the several tubs have so far cooled, that the average temperature of the different quantities united will be from 62 to 65 degrees, the process of *fermentation* then takes place; pour the whole into the gyle tun, add the yeast, and, having covered up the vessel, let it stand in a moderately warm place. The method of mixing yeast with the wort is as follows: take one pound of good yeast, and about two quarts of wort, stir them well together, and place them near the fire for a few minutes till the mixture begins to ferment; then pour the whole into the gyle tun, and agitate the contents briskly with the oar; then cover up the vessel. After fermenting twenty-four hours, take a handful of flour, and the same quantity of salt, place them before the fire to get warm, and sprinkle them over the contents of the gyle tun; then give the whole a good stirring. If the fermentation proceed too rapidly, and there appear danger of the whole contents of the vessel overflowing, the yeast may be beat down with a stick, and the tub uncovered: a door or window may also be opened in the place where the tub stands to admit a cool draught of air, for retarding the fermenting process. If the fermentation is languid and feeble, one or two large stone bottles, filled with hot water, closely corked, may be let down into the tub, to increase slightly the temperature of the liquor. The commencement of the fermentation is indicated by a line of small bubbles forming round the sides of the vessel, and in a short time extending over the whole surface. A crusty head soon forms, and then a thick rocky one, followed by a light frothy head. At length the head assumes a yeasty appearance, the color becomes yellowish-brown, and a vinous odor is developed. As soon as this last head begins to fall, the liquor should be skimmed continually every two or three hours until no more yeast is formed. It may be regarded as a rule that the lower the temperature is, and the slower, more regular, and less interrupted the process of fermentation, the better will be the quality of the brewing, and the less liable to be changed by age. *Cleansing* consists in running the beer from the gyle tun into casks or other vessels, set sloping, so that the yeast, as it forms, may work off the one side of the top, and fall into a vessel placed below to receive it. The process of *cleansing* is generally commen-

ced as soon as the saccharine in the fermenting wort falls to about ten pounds per barrel, a degree of attenuation which it usually reaches in about forty-eight hours. When *barreling* the beer, draw off the fermented liquor from the thick sediment in the fermenting vessel into clean casks, previously rinsed with boiling water; and when the casks have been filled, strike a few strokes with a mallet on the hoops, in consequence of which the air-bubbles become displaced, the liquor subsides a little and leaves more to be added. A slow fermentation will still go on in the beer, and an additional quantity of yeast become disengaged, and overflow the barrels, which should be placed with the bung-holes inclined a little on one side. The same liquor which overflows from the cask—being saved by means of vessels placed underneath—may be used for filling up the barrels. In four or five days the beer will have purged itself from the yeast; let it stand a few days more till the vinous fermentation is completed, which is easily perceived by the yeast at the bung-hole turning brown and becoming full of holes, the casks may then be bunged up. The cask should be occasionally examined, especially in warm weather If a hissing noise is audible at the bung-hole, the spile may be left in loosely till the liquor has become quiet; but it is better to check the fermentation, which may be done by repeatedly wetting the cask with cold water all over with a mop. The beer being well prepared and completely worked off, it will then be proper to remove it to the place where it is to remain for use. As soon as it is placed in the cellar—where it should be kept as far as possible from a current of air—the bung must be drawn, and the casks filled up quite full with fine beer, skimming off the head that will arise from time to time in consequence of its being rolled over. After being attended to in this manner for two or three days, the casks should be bunged tight, and a hole bored with a gimlet near the bung for the vent peg, which should be left rather slack for a day or two. In three weeks or a month the beer will become fine, and may then be tapped. The following important items in the process of brewing cannot be too strongly insisted upon:—The proper heats of the water in the different mashings; the length of time the water should stand on the mash; the time that the wort should actually boil; the necessity of getting the wort cool as soon as possible; the proper heat for mixing together the wort and the yeast, and the subsequent attention thereto; but above all the constant care to fill up the barrels repeatedly.

In addition to the foregoing special directions for the process of brewing, the following *hints and cautions* will be found worthy of attention. The *best time* for brewing is cool weather; March and October being expressly suited for brewing in a small way. If for want of room you are obliged to brew during warm weather, let the quantity be not greater than is requisite for immediate use; for most liquors, brewed during hot weather, seldom keep long. *Cleanliness* cannot be too particularly observed, especially in the summer season: every particle of matter left in the utensils, after being used, creates a foulness not easily afterwards got rid of, and inevitably imparts a bad taste for a length of time to subsequent brewings. Some days previous to the operation of brewing being commenced, all the casks and tubs should be filled with water, to render them tight. By neglecting this precaution, many disagreeable consequences may follow by unexpected leakage, particularly if the utensils are not well-seasoned vessels that are constantly kept in use. Immediately after the brewing utensils are made use of, they should be carefully and thoroughly washed out, and rinsed with cold water, and this operation must be renewed from time to time, if they are not soon again to be made use of. During the summer months a few lumps of unslaked lime should occasionally be thrown into each, and, with such lime liquor, the vessels should be well scoured. The copper likewise requires attention; it should never be used without being scoured, and in doing this the bottom, and all round the tap, should be specially examined, to see that no coat of verdigris adheres. *Preparations* should be made for brewing on the day before the actual process commences; the

materials should be laid ready at hand, the utensils arranged in proper order, the copper filled, and the coals provided for the fire. Purchase malt in or before the month of May, to avoid the summer-made malts. Malt is also cheaper at that period than at any other. Purchase hops in October or November; if in a good ripening season, and they are in fine condition, lay in your stock. Seasons differ greatly. Easterly winds are bad for brewing, and worts exposed to them rarely escape injury. The sweet wort particularly will often contract an acidity not to be eradicated; therefore always shut out easterly winds, whenever it is possible. The mash-tub, underback, &c., ought to be painted when new and dry; first, by priming, which should be followed by three coats of paint, each successive coat increasing in substance; thus forming an unyielding mass. Wood so guarded will never shrink. Avoid all drugs of every kind; the true flavor of beer is derived from malt and hops alone; and the introduction of other ingredients, independently of the injury they occasion, is utterly useless and opposed to common sense.

Measures of Length.—The subjoined engraving shows at the left a four-inch section of a common rule, the inch divisions being subdivided into twenty-fifths, twelfths, eights, and tenths. On the right is the French measure, indicating millimetres and centimetres. The French metre is intended to be the one ten-millionth part of the distance from either pole of the earth to the equator.



FRENCH MEASURE, UNITED STATES STANDARD.

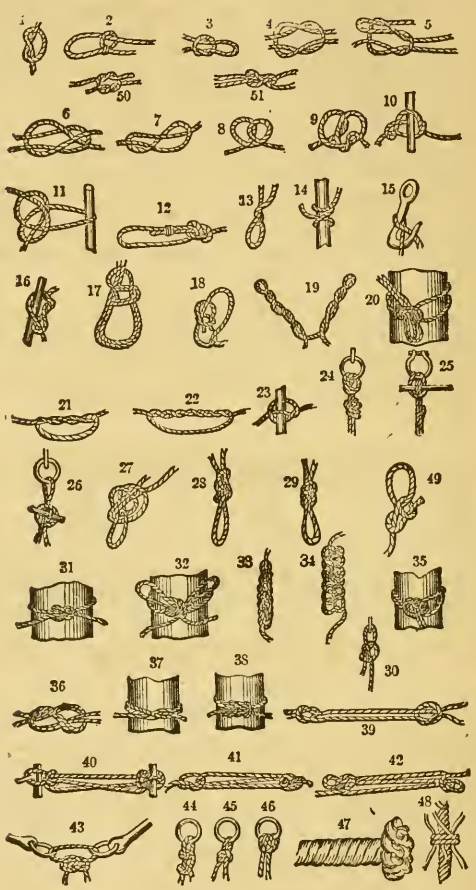
		1 millimetre	= $\frac{1}{25}$ of an inch nearly, or	.0393685 inch.
10 millimetres	make	1 centimetre	= $\frac{3}{8}$ of an inch full, or	.393685 inch.
10 centimetres	"	1 decimetre	= 4 inches nearly, or	3.93685 inches.
10 decimetres	"	1 METRE	= 3 feet 3⅜ inches +, or	39.3685 inches.
10 metres	"	1 decametre	= 32.871 feet, or	39.3685 inches.
10 decametres	"	1 hectometre	= 328.071 feet, or	.0621347 mile.
10 hectometres	"	1 kilometre	= 3280.71 feet, 3-5 or	.6213466 mile.
10 kilometres	"	1 myriametre	= 32807.3 feet, 6 1-5 or	6.213466 miles.

COMMON LONG MEASURE.

12	inches	make 1 foot.	40 rods	make	1 furlong = 220 yards = 660 feet.
3	feet	" 1 yard = 36 inches.	8 furl.	"	1 stat. or land mile=1760 yds.=5280 ft.
5½	yards	" 1 rod, pole or perch = 16½ feet.	3 miles	"	1 league.

A point = $\frac{1}{12}$ inch. A line = 6 points = $\frac{1}{12}$ inch. A palm = 3 inches. A span = 9 inches. A hand = 4 inches. A fathom = 6 feet. A cable's length = 120 fathoms = 720 feet. A Gunter's chain = 66 feet = 4 rods. 80 Gunter's = 1 mile. A nautical or sea-mile = 6086.07 feet, or $\frac{1}{21{,}600}$ part of the earth's circumference at the equator = 1,142,664 geographical or land miles. 1 degree at equator = 69.160 land miles. 1 land mile = .86755 of a nautical mile.

KNOTS, AND HOW TO TIE THEM.



The knots represented above are described in numerical order as follows:

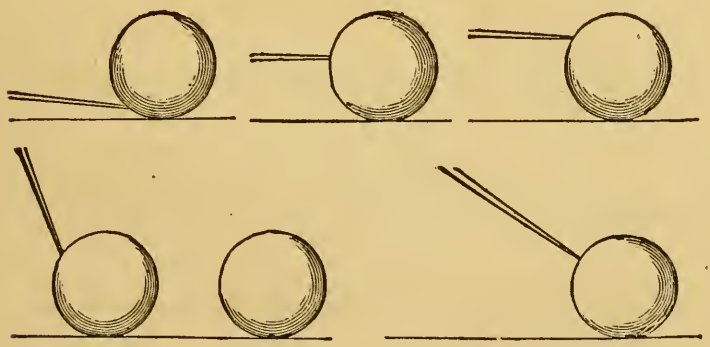
1. Simple overhand knot.
2. Slip-knot seized.
3. Single bow-knot.
4. Square or reef-knot.
5. Square bow-knot.
6. Weaver's knot.
7. German or figure-of-8 knot.
8. Two half-hitches, or artificer's knot.
9. Double artificer's knot.
10. Simple galley knot.
11. Capstan or prolonged knot.
12. Bowline-knot.
13. Rolling-hitch.
14. Clove hitch.
15. Blackwall-hitch.
16. Timber-hitch.
17. Bowline on a bight.

18. Running bowline.
19. Catspaw.
20. Doubled running-knot.
21. Double knot.
22. Six-fold knot.
23. Boat knot.
24. Lark's head.
25. Lark's head.
26. Simple boat-knot.
27. Loop-knot.
28. Double Flemish knot.
29. Running-knot checked.
30. Crossed running-knot.
31. Lashing-knot.
32. Rosette.
33. Chain-knot.
34. Double chain-knot.
35. Double running-knot, with check knot.
36. Double twist-knot.
37. Builders' knot.
38. Double Flemish knot.
39. English knot.
40. Shortening-knot.
41. Shortening-knot.
42. Sheep-shank.
43. Dog-shank.
44. Mooring-knot.
45. Mooring-knot.
46. Mooring-knot.
47. Pig-tail worked on the end of a rope.
48. Shroud knot.
49. A bend or knot used by sailors in making fast to a spar or a bucket-handle before casting overboard; it will not run. Also used by horsemen for a loop around the jaw of a colt in breaking: the running end, after passing over the head of the animal and through the loop, will not jam therein.
50. A granny's knot.
51. A weaver's knot.

The principle of a knot is, that no two parts which would move in the same direction if the rope were to slip, should lie alongside of and touching each other.

BILLIARD BALLS.

DIFFERENT POSITIONS OF THE CUE IN ORDER TO OBTAIN CERTAIN STROKES. (See page 363.)



WEIGHT OF ONE FOOT OF FLAT BAR IRON.

If a Bar of Iron be thicker than contained in the Table, add together the weight of two Numbers, or treble the weight of one Number. Wanted the weight of 1 foot of Bar iron, 4 inches broad and 2 1-4 inches thick. Opposite 4 and under 1 is 13.364, which doubled is 26.728; add the weight of 1-4th (3.341), equal 30.069 lbs.

Breadth in inches.	THICKNESS IN PARTS OF AN INCH.								
	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1 in.
1	.835	1.044	1.253	1.461	1.670	2.088	2.506	2.923	3.340
1 1/8	.939	1.174	1.409	1.644	1.878	2.348	2.818	3.287	3.755
1 1/4	1.044	1.305	1.566	1.826	2.088	2.609	3.132	3.653	4.176
1 3/8	1.148	1.435	1.722	2.009	2.296	2.870	3.444	4.018	4.592
1 1/2	1.252	1.566	1.879	2.192	2.504	3.131	3.758	4.384	5.008
1 5/8	1.358	1.696	2.035	2.374	2.716	3.392	4.070	4.749	5.432
1 3/4	1.462	1.827	2.192	2.557	2.924	3.653	4.384	5.114	5.848
1 7/8	1.566	1.957	2.348	2.740	3.132	3.914	4.696	5.479	6.264
2	1.671	2.088	2.475	2.922	3.342	4.175	5.010	5.845	6.684
2 1/8	1.775	2.218	2.662	3.105	3.550	4.435	5.324	6.210	7.100
2 1/4	1.880	2.348	2.918	3.288	3.760	4.696	5.636	6.575	7.520
2 3/8	1.984	2.479	2.975	3.470	3.968	4.957	5.950	6.941	7.936
2 1/2	2.088	2.609	3.131	3.653	4.176	5.218	6.262	7.306	8.352
2 5/8	2.193	2.740	3.288	3.836	4.386	5.479	6.576	7.671	8.772
2 3/4	2.297	2.870	3.444	4.018	4.594	5.740	6.888	8.036	9.188
2 7/8	2.402	3.001	3.601	4.201	4.804	6.001	7.202	8.402	9.608
3	2.506	3.131	3.758	4.384	5.012	6.262	7.516	8.767	10.024
3 1/4	2.715	3.392	4.071	4.749	5.430	6.784	8.142	9.498	10.860
3 1/2	2.923	3.653	4.384	5.114	5.846	7.306	8.768	10.228	11.692
3 3/4	3.132	3.914	4.697	5.479	6.264	7.828	9.394	10.959	12.528
4	3.341	4.175	5.010	5.845	6.682	8.350	10.020	11.690	13.364
4 1/4	3.549	4.436	5.300	6.210	7.098	8.871	10.646	12.421	14.192
4 1/2	3.758	4.697	5.605	6.575	7.516	9.393	11.272	13.151	15.032
4 3/4	3.966	4.958	5.950	6.941	7.932	9.915	11.898	13.881	15.864
5	4.075	5.219	6.263	7.306	8.350	10.437	12.526	14.612	16.700
5 1/4	4.184	5.479	6.573	7.671	8.768	10.958	13.152	15.343	17.536
5 1/2	4.593	5.741	6.889	8.037	9.186	11.480	13.778	16.073	18.372
5 3/4	4.801	6.001	7.202	8.402	9.602	12.002	14.404	16.804	19.204
6	5.010	6.622	7.515	8.767	10.020	12.524	15.030	17.535	20.042

WEIGHT OF ONE SQUARE FOOT OF SHEET IRON.

Names.	Thickness by the Birmingham (Eng.) Wire Gauge.													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Iron.	12.50	12.00	11.00	10.00	8.74	8.12	7.50	6.86	6.24	5.62	5.00	4.38	3.74	3.12
Cop.	14.50	13.90	12.75	11.60	10.10	9.40	8.70	7.39	7.20	6.50	5.80	5.08	4.34	3.60
Brass	13.75	13.20	12.10	11.90	9.61	8.93	8.25	7.54	6.87	6.18	5.50	4.81	4.12	3.43

	Thickness by the Wire Gauge.															
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Iron.	2.82	2.50	2.18	1.86	1.70	1.54	1.40	1.25	1.12	1.00	.90	.80	.72	.64	.56	.50
Cop.	3.27	2.90	2.53	2.15	1.97	1.78	1.62	1.45	1.30	1.16	1.04	.92	.83	.74	.64	.58
Brass	3.10	2.75	2.40	2.04	1.87	1.69	1.54	1.37	1.23	1.10	.99	.88	.79	.70	.61	.55

No. 1 Wire Gauge is 5-16ths of an inch; No. 4 is 1-4th; No. 11 is 1-8th; No. 13 is 1-12th; No. 15 is 1-14th; No. 16 is 1-16th; No. 17 is 1-18th; No. 19 is 1-23; No. 22 is 1-32.

WEIGHT OF BAR IRON AND OTHER METALS.

RUSSIA SHEET IRON

Measures 56 by 28 inches, and is rated by the weight per sheet. The numbers run from 8 to 18 Russian lbs. per sheet. 8 Russian pounds equal 7.2 English pounds ; 9 = 8.1 lbs.; 10 = 9 lbs.; 11 = 10 lbs.; 12 = 11.2 lbs., &c.—100 Russian lbs. equal 90 lbs. English.

WEIGHT OF ONE SQUARE FOOT OF PLATE IRON, &c.

Thickness in parts of an inch.	Iron.	Copper.	Brass.	Lead.	Thickness in parts of an inch.	Iron.	Copper.	Brass.	Lead.
1/16	2.5	2.9	2.7	3.7	7/16	17.5	20.3	19.0	25.9
1/8	5.0	5.8	5.5	7.4	1/2	20.0	23.2	21.8	29.6
3/16	7.5	8.7	8.2	11.1	5/8	25.0	28.9	47.1	37.0
1/4	10.0	11.6	10.9	14.8	3/4	30.0	34.7	32.5	44.4
5/16	12.5	14.5	13.6	18.5	7/8	35.0	40.4	37.9	57.8
3/8	15.0	17.4	16.3	22.2	1	40.0	46.2	43.3	59.2

WEIGHT ONE FOOT IN LENGTH OF SQUARE AND ROUND BAR IRON.

Side and diameter in inches.	Square Iron in lbs.	Round Iron in lbs.	Side and diameter in inches.	Square Iron in lbs.	Round Iron in lbs.	Side and diameter in inches.	Square Iron in lbs.	Round Iron in lbs.
1/4	.209	.164	1 5/8	8.820	6.928	3 3/4	46.969	36.895
5/16	.326	.256	1 3/4	10.229	8.043	3 7/8	50.153	39.390
3/8	.470	.369	1 7/8	11.744	9.224	4	53.440	41.984
7/16	.640	.503	2	13.360	10.496	4 1/8	56.833	44.637
1/2	.835	.656	2 1/8	15.083	11.846	4 1/4	60.329	47.385
9/16	1.057	.831	2 1/4	16.909	13.283	4 3/8	63.930	50.211
5/8	1.305	1.025	2 3/8	18.840	14.797	4 1/2	67.637	53.132
11/16	1.579	1.241	2 1/2	20.875	16.396	4 5/8	71.445	56.113
3/4	1.879	1.476	2 5/8	23.115	18.146	4 3/4	75.359	59.187
13/16	2.205	1.732	2 3/4	25.259	19.842	4 7/8	79.378	62.344
7/8	2.558	2.011	2 7/8	27.608	21.684	5	83.510	65.585
15/16	2.936	2.306	3	30.070	23.653	5 1/4	92.459	72.618
1	3.340	2.624	3 1/8	32.618	25.620	5 1/2	101.039	79.370
1 1/8	4.228	3.321	3 1/4	35.279	27.709	5 3/4	110.429	86.731
1 1/4	5.219	4.099	3 3/8	38.045	29.881	6	120.243	94.610
1 3/8	6.315	4.961	4 1/2	40.916	32.170			
1 1/2	7.516	5.913	5 5/8	43.890	34.472			

The weight of Bar Iron being 1
" " " Cast Iron = .95
" " " Steel, 1.03
" " " Copper, 1.16

CAST IRON COLUMNS. MOULDER'S TABLE.

DIMENSIONS OF CYLINDRICAL COLUMNS OF CAST IRON TO SUSTAIN A PRESSURE WITH SAFETY.

Diameter in inches.	LENGTH OR HEIGHT IN FEET.										
	4	6	8	10	12	14	16	18	20	22	24
	WEIGHT OR LOAD IN CWTS.										
2	72	60	49	40	32	26	22	18	15	13	11
2½	119	105	91	77	65	55	47	40	34	29	25
3	178	163	145	128	111	97	84	73	64	56	49
3½	247	232	214	191	172	156	135	119	106	94	83
4	326	310	288	266	242	220	198	178	160	144	130
4½	418	400	379	354	327	301	275	251	229	208	189
5	522	501	479	452	427	394	365	337	310	285	262
6	607	592	573	550	525	497	469	440	413	386	360
7	1032	1013	989	959	924	887	848	808	765	725	686
8	1333	1315	1289	1259	1224	1185	1142	1097	1052	1005	959
9	1716	1697	1672	1640	1603	1561	1515	1467	1416	1364	1311
10	2119	2100	2077	2045	2007	1964	1916	1865	1811	1755	1697
11	2570	2550	2520	2490	2450	2410	2358	2305	2248	2189	2127
12	3050	3040	3020	2970	2930	2900	2830	2780	2730	2670	2600

Practical utility of the Table.

Note.—Wanting to support the front of a building with cast iron columns 18 feet in length, 8 inches in diameter, and the metal 1 inch in thickness; what weight may I confidently expect each column capable of supporting without tendency to deflection?

Opposite 8 inches diameter and under 18 feet = 1097
*Also opposite 6 in. diameter and under 18 feet = 440

=657 cwt.

*This deduction is on account of the core.

MOULDER'S TABLE.

Bar Iron being 1,			*Cast Iron* being 1,			*Yellow Pine* being 1,		
Cast Iron equals		.95	Bar Iron equals		1.07	Cast Iron equals		12.
Steel	"	1.02	Steel	"	1.08	Brass	"	12.7
Copper	"	1.16	Brass	"	1.16	Copper	"	13.3
Brass	"	1.09	Copper	"	1.21	Lead	"	18.1
Lead	"	1.48	Lead	"	1.56	Zinc	"	11.5

1. Suppose I have an article of plate iron, the weight of which is 728 lbs., but want the same of copper, and of similar dimensions, what will be its weight.

$$728 \times 1.16 = 844.48 \text{ lbs.}$$

2. A model of Dry Pine weighing 3 lbs., and in which the iron for its construction forms no material portion of the weight, what may I anticipate its weight to be in cast iron.

$$3 \times 12 = 36 \text{ pounds.}$$

It frequently occurs, in the construction of models, that neither the quality, or condition of the wood can be properly estimated; and in such cases, it may be a near enough approximation to reckon 13 lbs. of cast iron to each pound of model.

CAPACITY OF CISTERNS AND RESERVOIRS IN GALLONS.

Depth, 10 *Inches:—Diameter from* 2 *to* 25 *Feet.*

2	feet	19.5	5	feet	122.40	8	feet	313.33	12	feet	705.
2½	"	30.6	5½	"	148.10	8½	"	353.72	13	"	827.4
3	"	44.06	6	"	176.25	9	"	396.56	14	"	959.6
3½	"	59.97	6½	"	206.85	9½	"	461.40	15	"	1101.6
4	"	78.33	7	"	239.88	10	"	489.20	20	"	1958.4
4½	"	99.14	7½	"	275.40	11	"	592.40	25	"	3059.9

NUMBER OF THREADS IN V-THREAD SCREWS.

Diam. in inches	¼	5/16	⅜	7/16	½	⅝	¾	⅞	1	1⅛	1¼	1⅜
No. of threads	20	18	16	14	12	11	10	9	8	7	7	6
Diam. in inches	1½	1⅝	1¾	1⅞	2	2¼	2½	2¾	3	3¼	3½	
No. of threads	6	5	5	4½	4½	4	4	3½	3½	3¼	3¼	
Diam. in inches	3¾	4	4¼	4½	4¾	5	5¼	5½	5¾	6		
No. of threads	3	3	2⅞	2⅞	2¾	2¾	2⅝	2⅝	3½	2½		

The depth of the threads should be half their pitch. The diameter of a screw, to work in the teeth of a wheel, should be such, that the angle of the thread does not exceed 10°

SCREW-THREADS FOR GAS-PIPES.

The standard for gas-pipes is as follows:

Diameter inside.	Threads to the inch.	Diameter inside.	Threads to the inch.
⅛	27	1	11½
¼	18	1¼	11½
⅜	18	1½	11½
½	14	2	11½
¾	14		

For all diameters above this, eight threads per inch is the standard.

CAST IRON.

WEIGHT OF A FOOT IN LENGTH OF FLAT CAST IRON.

Width of Iron.	Thick, 1-4th inch.	Thick, 3-8ths inch.	Thick, 1-2 inch.	Thick, 5-8ths inch.	Thick, 3-4ths inch.	Thick, 7-8ths inch.	Thick, 1 inch.
Inches.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.
2	1.56	2.34	3.12	3.90	4.68	5.46	6.25
2¼	1.75	2.63	3.51	4.39	5 27	6.15	7.03
2½	1.95	2.92	3.90	4.88	5.85	6.83	7.81
2¾	2.14	3.22	4.29	5.37	6.44	7.51	8.59
3	2.34	3.51	4.68	5.85	7.03	8.20	9.37
3¼	2.53	3.80	5.07	6.34	7.61	8.88	10.15
3½	2.73	4.10	5.46	6.83	8.20	9.57	10.93
3¾	2.93	4.39	5.85	7.32	8.78	10.25	11.71
4	3.12	4.68	6.25	7.81	9.37	10.93	12.50
4¼	3.32	4.97	6.64	8.30	9.96	11.62	13.28
4½	3.51	5.27	7.03	8.78	10.54	12.30	14.06
4¾	3.71	5.56	7.42	9 27	11.13	12.98	14.84
5	3.90	5.86	7.81	9.76	11.71	13.67	15.62
5¼	4.10	6.15	8.20	10.25	12.30	14.35	16.40
5½	4.29	6.44	8.59	10.74	12.89	15.03	17.18
5¾	4.49	6.73	8.98	11.23	13.46	15.72	17.96
6	4.68	7.03	9.37	11.71	14.06	16.40	18.75

WEIGHT OF ROUND AND SQUARE CAST IRON.

CAST IRON.—Weight of a Foot in length of Square and Round.

SQUARE.				ROUND.			
Size.	Weight.	Size.	Weight.	Size.	Weight.	Size.	Weight.
Inches Square.	Pounds.	Inches Square.	Pounds.	Inches Diam.	Pounds.	Inches Diam.	Pounds.
1/2	.78	4 7/8	74.26	1/2	.61	4 7/8	58.32
5/8	1.22	5	78.12	5/8	.95	5	61.35
3/4	1.75	5 1/8	82.08	3/4	1.38	5 1/8	64.46
7/8	2.39	5 1/4	86.13	7/8	1.87	5 1/4	67.64
1	3.12	5 3/8	90.28	1	2.45	5 3/8	70.09
1 1/8	3.95	5 1/2	94.53	1 1/8	3.10	5 1/2	74.24
1 1/4	4.88	5 5/8	98.87	1 1/4	3.83	5 5/8	77.65
1 3/8	5.90	5 3/4	103.32	1 3/8	4.64	5 3/4	81.14
1 1/2	7.03	5 7/8	107.86	1 1/2	5.52	5 7/8	84.71
1 5/8	8.25	6	112.50	1 5/8	6.48	6	88.35
1 3/4	9.57	6 1/4	122.08	1 3/4	7.51	6 1/4	95.87
1 7/8	10.98	6 1/2	132.03	1 7/8	8.62	6 1/2	103.69
2	12.50	6 3/4	142.38	2	9.81	6 3/4	111.82
2 1/8	14.11	7	153.12	2 1/8	11.08	7	120.26
2 1/4	15.81	7 1/4	164.25	2 1/4	12.42	7 1/4	129.
2 3/8	17.62	7 1/2	175.78	2 3/8	13.84	7 1/2	138.05
2 1/2	19.53	7 3/4	187.68	2 1/2	15.33	7 3/4	147.41
2 5/8	21.53	8	200.12	2 5/8	16.91	8	157.08
2 3/4	23.63	8 1/4	212.56	2 3/4	18.56	8 1/4	167.05
2 7/8	25.83	8 1/2	225.78	2 7/8	20.28	8 1/2	177.10
3	28.12	8 3/4	239.25	3	22.18	8 3/4	187.91
3 1/8	30.51	9	253.12	3 1/8	23.96	9	198.79
3 1/4	33.	9 1/4	267.38	3 1/4	25.92	9 1/4	210.
3 3/8	35.59	9 1/2	282.	3 3/8	27.95	9 1/2	221.50
3 1/2	38.28	9 3/4	297.07	3 1/2	30.16	9 3/4	233.31
3 5/8	41.06	10	312.50	3 5/8	32.25	10	245.43
3 3/4	43.94	10 1/4	328.32	3 3/4	34.51	10 1/4	257.86
3 7/8	46.92	10 1/2	344.53	3 7/8	36.85	10 1/2	270.59
4	50.	10 3/4	361.13	4	39.27	10 3/4	283.63
4 1/8	53.14	11	378.12	4 1/8	41.76	11	296.97
4 1/4	56.44	11 1/4	395.50	4 1/4	44.27	11 1/4	310.63
4 3/8	59.81	11 1/2	413.78	4 3/8	46.97	11 1/2	224.59
4 3/4	63.28	11 3/4	431.44	4 1/2	49.70	11 3/4	338.85
4 5/8	66.84	12	450.	4 5/8	52.50	12	353.43
4 3/4	70.50			4 3/4	55.37		

STEEL.—Weight of a Foot in Length of Flat.

Size.	Thick, 1-4 in.	Thick, 3-8ths.	Thick, 1-2 in.	Thick, 5-8ths.	Size.	Thick, 1-4 in.	Thick 3-8ths	Thick, 1-2 in.	Thick, 5-8ths.
In.	Pds.	Pds.	Pds.	Pds.	In.	Pds.	Pds.	Pds.	Pds.
1	852	1 27	1 70	2 13	2 1/2	2 13	3 20	4 26	5 32
1 1/8	958	1 43	1 91	2 39	2 3/4	2 34	3 51	4 68	5 85
1 1/4	1 06	1 59	2 13	2 66	3	2 55	3 83	5 11	6 39
1 3/8	1 17	1 75	2 34	2 92	3 1/4	2 77	4 15	5 53	6 92
1 1/2	1 27	1 91	2 55	3 19	3 1/2	2 98	4 47	5 98	7 45
1 3/4	1 49	2 23	2 98	3 72	3 3/4	3 19	4 79	6 38	7 98
2	1 70	2 55	3 40	4 26	4	3 40	5 10	6 80	8 52
2 1/4	1 91	2 87	3 83	4 79					

PATENT IMPROVED LEAD PIPE.—*Sizes and Weight per Foot.*

Calibre	Weight per foot.	Calibre	Weight per foot.	Calibre	Weight per foot	Calibre	Weight per foot.	Calibre	Weight per foot.
Inches.	lbs. ozs.	Inches	lbs. ozs.	Inches	lbs. ozs.	Inches	lbs. ozs.	Inches	lbs. ozs.
3/8	6		1 4	3/4	1 4	1	4 0	1 1/2	5 0
"	8	"	1 8	"	2 0	"	6 0	1 3/4	4 0
"	10	"	2 0	"	2 4	1 1/4	2 8	2	5 0
"	12	"	3 0	"	2 8	"	3 0	"	6 0
"	1 0	5/8	13	"	3 0	"	3 8	"	7 0
"	1 8	"	1 0	"	4 0	"	4 0	2 1/2	11 0
5/8	8	"	1 8	1	1 8	"	5 0	3	13 0
"	10	"	2 0	"	2 12	1 1/2	3 0	3 1/2	15 0
"	12	"	2 12	"	2 0	"	3 8	4	18 0
"	14	3/4	12	"	2 8	"	4 0	4 1/2	20 0
"	1 0	"	14	"	3 0	"	4 8	5	22 0

1/4 in. thick.

SHEET LEAD.—Weight of a Square Foot, 2½, 3, 3½, 4, 4½, 5, 6, 7, 8½, 9, 10 lbs., and upwards.

BRASS, COPPER, STEEL, AND LEAD.—*Weight of a Foot.*

	BRASS.		COPPER.		STEEL.		LEAD.	
Diameter and Side of Square	Weight of Round.	Weight of Square.	Weight of Round.	Weight of Square.	Weight of Round.	Weight of Square.	Weight of Round.	Weight of Square.
Inches.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1/4	17	22	19	24	17	21		
3/8	39	50	42	54	38	48		
1/2	70	90	75	96	67	85		
5/8	1.10	1.40	1.17	1.50	1.04	1.33		
3/4	1.59	2.02	1.69	2.16	1.50	1.91		
7/8	2.16	2.75	2.31	2.94	2.05	2.61		
1	2.83	3.60	3.02	3.84	2.67	3.40	3.87	4.93
1 1/8	3.58	4.56	3.82	4.86	3.38	4.34	4.90	6.25
1 1/4	4.42	5.63	4.71	6.	4.18	5.32	6.06	7.71
1 3/8	5.35	5.81	5.71	7.27	5.06	6.44	7.33	9.33
1 1/2	6.36	8.10	6.79	8.65	6.02	7.67	8.72	11.11
1 5/8	7.47	9.51	7.94	10.15	7.07	9.	10.24	13.04
1 3/4	8.66	11.03	9.21	11.77	8.20	10.14	11.87	15.12
1 7/8	9.95	12.66	10.61	13.52	9.41	11.98	13.63	17.36
2	11.32	14.41	12.08	15.38	10.71	13.63	15.51	19.75
2 1/8	12.78	16.27	13.64	17.36	12.05	15.80	17.51	22.29
2 1/4	14.32	18.24	15.29	19,47	13.51	17.20	19.63	25.
2 3/8	15.96	20.32	17.03	21.69	15.05	19.17	21.80	27.80
2 1/2	17.68	22.53	18.87	24.03	16.68	21.21	24.24	30.86
2 5/8	19.50	24.83	20.81	26.50	18.39	23.41	26.72	34.02
2 3/4	21.40	27.25	22.84	29.08	20.18	25.70	29.33	37.34
2 7/8	23.39	29.78	24.92	31.79	22.06	28.10	32.05	40.81
3	25.47	32.43	27.18	34.61	24.23	30.60	34.90	44.44

CAST IRON.—*Weight of a Superficial Foot from 1/4 to 2 inches thick.*

Size	Weight.	Size	Weight.	Size	Weight.	Size	Weight.	Size	Weight.
Ins.	Pounds.	Ins.	Pounds.	Ins.	Pounds.	Ins.	Pounds.	Ins.	Pounds.
1/4	9.37	5/8	23.43	1	37.50	1 3/8	51.56	1 3/4	65 62
3/8	14.06	3/4	28.12	1 1/8	42.18	1 1/2	56.25	1 7/8	70 31
1/2	18.75	7/8	32.81	1 1/4	46.87	1 5/8	60.93	2	75

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